

Report 11382  
22 February 1999

**GENCORP**  
**AEROJET**

**Integrated Advanced Microwave Sounding Unit-A  
(AMSU-A)**

**Engineering Test Report**

**SARR, SARP, DCS Receivers, Link Frequencies**

**EMI Sensitive Band Test Results**

**AMSU-A2, S/N 106**

**Contract No. NAS 5-32314  
CDRL 207**

**Submitted to:**

**National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, Maryland 20771**

**Submitted by:**

**Aerojet  
1100 West Hollyvale Street  
Azusa, California 91702**

**Aerojet**



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## **SECTION 1**

### **INTRODUCTION**

#### **1.1 General**

This document contains the procedures and test results of the discrete SARP EMI sensitive bands measurements performed on the AMSU-A2/METSAT instrument, part number 1331200-2, serial number 106. The test was performed as described in paragraph 3.4.6 of AE-26151/5D Test Procedure, Electromagnetic Interference (EMI)/Electromagnetic Radiation (EMR) and Electromagnetic Compatibility (EMC) for Advanced Microwave Sounding Unit-A (AMSU-A), dated 22 September 1998.

#### **1.2 Purpose**

The purpose of this report is to demonstrate that the frequency bands described in the Interface Specification, IS-3267415, paragraph 3.6.1.4.2 are not generated or present above the sensitivity level specified in the radiation requirements of the aforementioned specification.

#### **1.3 Scope**

This document describes the test performed by Aerojet, and it is presented in the following manner:

- |           |  |
|-----------|--|
| Section 1 | Contains general introductory material and a summary of the test results.                          |
| Section 2 | Contains a detailed description of the test plan, test procedure, and test results.                |
| Section 3 | Contains supplementary test information, pertinent test data, and the list of test equipment used. |

#### **1.4 Summary of Test Results**

The test performed at each frequency band specified herein indicates that the AMSU-A2 instrument meets the requirements of the interface specification. No radiated emissions were detected in the measured frequency ranges above the sensitivity required.

## **SECTION 2**

### **TEST PROGRAM**

#### **2.1 Test Article**

The AMSU-A system passively monitors radiation from the earth's surface and atmosphere in the microwave portion of the spectrum. The instruments incorporate fifteen total-power super heterodyne type radiometers. The system is composed of two independent instruments. The module designated as AMSU-A2 contains the two lowest-frequency channels, i.e., Channel 1 has the 28.8 GHz frequency and Channel 2 has the 31.4 GHz frequency. The module designated as AMSU-A1 contains the thirteen remaining channels with frequencies from 50.8 GHz to 89 GHz.

Periodic on board calibration is accomplished by using an in-flight backbody calibration and cold space as energy reference sources. During each scan, the shrouded reflector observes 30 earth scene cells with one sample period each and two calibration target cells with two sample periods each. Complete end-to-end in-flight calibration from the antenna to the AMSU-A instrument output is provided for each channel. This will yield the maximum in-flight calibration accuracy that gives the radiometric data the required sensitivity and precision.

At each frequency, the half power antenna beamwidth is a constant  $3.33^\circ$ . Thirty contiguous scene resolution cells spaced  $3.33^\circ$  along the scan line are sampled in a stepped-scan fashion every eight seconds. The scan covers  $50^\circ$  on each side of the satellite path.

#### **2.2 Test Starting and Completion Dates**

The AMSU-A2 instrument, serial number 106, was tested between 24 November and 1 December 1998. No testing was performed during the period of 26 to 29 November 1998.

#### **2.3 Instrumentation**

All instrumentation was suitable for the purpose intended. Each instrument used was within its certification period. Instrumentation accuracy was verified by calibration in accordance with MIL-STD-45662 as implemented and controlled by Aerojet standard operating procedures. The attached Test Data Sheet 2, in Section 3, contains the list of the equipment with pertinent traceability information.

#### **2.4 Test Frequencies**

The test frequencies were selected from paragraph 3.6.1.4.2 of the interface specification, IS-3267415, as listed in Table I.

Table I. SARR, SARP, DCS Receiver, and Link Frequencies

| Item No. | Frequency (MHz)          | Level (dBm) |
|----------|--------------------------|-------------|
| 1        | 118.0 – 120.0            | -100        |
| 2        | 120.0 – 121.45           | -125        |
| 3        | 121.45 – 121.485         | -145        |
| 4        | 121.5 MHz $\pm$ 15 kHz   | -150        |
| 5        | 121.515 – 121.550        | -145        |
| 6        | 121.550 – 123.00         | -125        |
| 7        | 123.00 – 125.00          | -100        |
| 8        | 236.00 – 240.00          | -100        |
| 9        | 240.00 – 242.925         | -125        |
| 10       | 242.945 – 242.975        | -145        |
| 11       | 243 MHz $\pm$ 25 kHz     | -150        |
| 12       | 243.025 – 243.075        | -145        |
| 13       | 243.075 – 246.00         | -125        |
| 14       | 246.00 – 250.00          | -100        |
| 15       | 385.10 – 401.10          | -100        |
| 16       | 401.10 – 405.90          | -125        |
| 17       | 405.90 – 406.00          | -145        |
| 18       | 406.05 MHz $\pm$ 50 kHz  | -150        |
| 19       | 406.10 – 406.20          | -145        |
| 20       | 406.20 – 411.00          | -125        |
| 21       | 411.00 – 425.00          | -100        |
| 22       | 396.00 – 401.50          | -125        |
| 23       | 401.50 – 401.60          | -145        |
| 24       | 401.630 MHz $\pm$ 50 kHz | -150        |
| 25       | 401.700 – 401.800        | -145        |
| 26       | 401.800 – 406.00         | -120        |
| 27       | 2010 – 2040              | -120        |

## 2.5 Operational Mode

The AMSU-A2 instrument was tested in the IN-ORBIT mode of operation. In this mode, the antenna is rotating continuously and all the circuits are working. The maximum electric field radiated emissions are produced in this mode of operation.

## 2.6 Test Location

This test was conducted in the shielded enclosure located in Building 183 of the Aerojet test facility.

## 2.7 Test Procedure

The test procedure used for the performance of this test was extracted from the Process Specification, Test Procedure, Electromagnetic Interference (EMI)/Electromagnetic Radiation (EMR) and Electromagnetic Compatibility (EMC) for Advanced Microwave Sounding Unit-A (AMSU-A), document number AE-26151/5D paragraph 3.4.6.3.1, steps 14 through 23 changed as described below:

- Step 14 - Activate the HP70004 with the HP70620 amplifier. Program the analyzer for noise averaging to a minimum of eight times. Verify that the minimum discernable signal level is below the required dBm level indicated in the list for the frequency band indicated.
- Step 15 - Connect the equipment of step 14 to the biconical antenna and measure the radiated levels throughout the frequency bands from 118.0 MHz to 125.0 MHz. Performed the test in both polarities of the antenna.
- Step 16 - Connect the equipment to the Log Periodic antenna and measure the radiated levels throughout the frequency bands from 236.0 MHz to 406.0 MHz. Performed the test in both polarities of the antenna.
- Step 17 - Connect the equipment to the double ridged wave antenna and measure the radiated levels throughout the frequency band from 2010 MHz to 2040 MHz. Perform the test in both polarities of the antenna.
- Step 18 - All of the measurements performed in steps 15, 16, and 17 shall be below the signal sensitivity. No narrow band signals shall be above the limit whether ambient or generated by the equipment.
- Step 19 - The measurement of steps 14 through 18 shall be at the equipment minimum discernable signal and detected narrow bands are below or at the sensitivity requirement levels in Table I.

## 2.8 Test Results

No radiated emissions were recorded above the specified sensitivity levels in Table I. The emissions detected were ambient emissions produced by the Halon System. Some emissions were introduced into the shielded enclosure via the interconnect cables. In this case, the cables were moved to an area of minimum emissions, i.e., until the detected emissions were below the specified level.

The first complete scan of all the required frequency bands was conducted during the 24th and 25th of November. A retest of the marginal frequency bands was conducted on the 30th of November and the 1st of December.

The recorded data is presented in this order:

- |                    |   |
|--------------------|---|
| Plots 1 through 7  | Covers the frequency range from 118.00 MHz to 125.00 MHz, with the antenna in the horizontal position.  |
| Plots 8 through 14 | Covers the above frequency range with the antenna in the vertical position. The detected emission that approximated the limit was a signal at 121.510 MHz, 2.07 dBm below the limit, with the antenna in the horizontal position. |

|                     |  |
|---------------------|--|
| Plots 15 through 21 | Covers the frequency range from 236.00 MHz to 250.00 MHz, with the antenna in the horizontal position.   |
| Plots 22 through 28 | Covers the above frequency range with the antenna in the vertical position. The detected emission that approximated the limit was a signal 242.983 MHz, 1.02 dBm below the limit, with the antenna in the horizontal position.                   |
| Plots 29 through 35 | Covers the frequency range from 385.10 MHz to 425.00 MHz, with the antenna in the horizontal position.   |
| Plots 36 through 42 | Covers the above frequency range with the antenna in the vertical position. The detected emission that approximated the limit was a signal at 406.021 MHz, 0.72 dBm below the limit, with the antenna in the vertical position.                  |
| Plots 43 through 47 | Covers the frequency range from 396.00 MHz to 406.00 MHz, with the antenna in the horizontal position.   |
| Plots 48 through 52 | Covers the above frequency range with the antenna in the antenna in the vertical position. The detected emissions that approximated the limit was a signal at 401.601 MHz, 0.86 dBm below the limit with the antenna in the horizontal position. |
| Plots 53 and 54     | Covers the frequency range from 2,010 MHz and 2,040 MHz, with the antenna in the horizontal and vertical position respectively. All emissions are at a minimum 10 dBm below the limit.   |

The referenced plots are presented in Section 3.

## **SECTION 3**

### **SUPPLEMENTARY INFORMATION**

#### **3.1 Supplementary Information**

This section contains the Test Data Sheet, Plots, and the equipment list.

AE-26151/5D  
22 Sep 98

TEST DATA SHEET 2 (Sheet 1 of 3)  
3.4.6: RE02 Test

Test Setup Verified: Ken Shaw



11/21/98

Signature

3.4.6.3.1 Step 1: Test Equipment Log

| Item                 | Manufacturer   | Model/<br>Part No. | Aerojet<br>Inventory No. | Calibration<br>Date | Calibration<br>Due Date |
|----------------------|----------------|--------------------|--------------------------|---------------------|-------------------------|
| Spectrum Analyzer    | HP             | 70004              | C200064                  | 11-12-98            | 11-12-99                |
| with Amplifier       | HP             | 70620              | C200064                  | 11-12-98            | 11-12-99                |
| Plotter              | HP             | 7475A<br>2241A     | 47417                    | CNR                 | CNR                     |
| Biconical Antenna    | HP             | 11955A             | C200224                  | 1-16-98             | 1-16-99                 |
| Log Periodic Antenna | HP             | 11956A             | C200225                  | 1-16-98             | 1-16-99                 |
| Horn Antenna         | Electrometrics | RGA-18C            | L508357                  | 10-21-98            | 10-21-99                |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |
|                      |                |                    |                          |                     |                         |

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Figure 1. Test Data Sheet (Sheet 1 of 3)

AE-26151/5D  
22 Sep 98

TEST DATA SHEET 2 (Sheet 2 of 3)  
3.4.6: RE02 Test (Cont)

Test Setup Verified: Ken Shaver 12-1-98  
Signature

3.4.6.3.2: Emission Measurements

| Step | Antenna/Frequency  | Band   | Required                               | Emissions within limits? |    | Comments/<br>Observations |
|------|--|--------|--|--------------------------|----|---------------------------|
|      |  |        |  | Yes                      | No |                           |
| 4    | All except Horn<br>14 kHz to 1 GHz                                       | Narrow | See Figure 3                           |                          |    |                           |
| 6    | All except Horn<br>14 kHz to 1 GHz                                       | Broad  | See Figure 4                           |                          |    |                           |
| 12   | Horn, RGA-180<br>1 to 2 GHz  | Narrow | See Figure 3                           |                          |    |                           |
| 15   | Biconical, EMCO 3104<br>121.5 MHz with Ampl                              | Narrow | No narrow-<br>band freq.<br>> -150 dBm | ✓                        |    |                           |
| 16   | Log Conical, EMCO 3101<br>243 MHz, 401.65 MHz, &<br>406.05 MHz with Ampl | Narrow | No narrow-<br>band freq.<br>> -150 dBm | ✓                        |    |                           |
| 19   | Horn, RGA-180<br>2010 to 2040 MHz with<br>Ampl                           | Narrow | No narrow-<br>band freq.<br>> -120 dBm | ✓                        |    |                           |
| 21   | Biconical/Log Conical<br>59.458 to 751.944 MHz                           | Narrow | No narrow-<br>band freq.<br>> -60 dBm  |                          |    |                           |
| 21   | 400 to 500 MHz   | Narrow | -107.1 dBm                             |                          |    |                           |
| 21   | 2 to 18 GHz  | Narrow | Figure 3                               |                          |    |                           |
| 21   | 1217 to 1227 MHz   | Narrow | -111.8 dBm                             |                          |    |                           |
| 21   | 1565 to 1614 MHz   | Narrow | -111.2 dBm                             |                          |    |                           |
| 21   | 2051.9 to 2055 MHz   | Narrow | -126.7 dBm                             |                          |    |                           |
| 21   | 5254.7 to 5255.3 MHz   | Narrow | -122.8 dBm                             |                          |    |                           |
| 21   | 5450 to 5825 MHz   | Narrow | -80.7 dBm                              |                          |    |                           |

NOTE: Attach all backup data generated during the test (photos, printouts, plots, test logs, additional comments or observations, etc.) to this data sheet.

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Figure 1. Test Data Sheet (Sheet 2 of 3)



AE-26151/5D  
22 Sep 98

TEST DATA SHEET 2 (Sheet 3 of 3)  
3.4.6: RE02 Test (Cont)

Test Setup Verified: Ran Shaw 12-1-98  
Signature

3.4.6.3.2: Emission Measurements

| Step | Antenna*/Frequency Range (MHz) | Band   | Radiation Limit (dBm) | Emissions within limits? |    | Comments/<br>Observations |
|------|--------------------------------|--------|-----------------------|--------------------------|----|---------------------------|
|      |                                |        |                       | Yes                      | No |                           |
| 22   | 118.000 - 120.000              | Narrow | -100 / Table IV       | ✓                        | ✓  |                           |
| 22   | 120.000 - 121.450              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 22   | 121.450 - 121.485              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 22   | 121.515 - 121.550              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 22   | 121.550 - 123.000              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 22   | 123.000 - 125.000              | Narrow | -100 / Table IV       | ✓                        | ✓  |                           |
| 23   | 236.000 - 240.000              | Narrow | -100 / Table IV       | ✓                        | ✓  |                           |
| 23   | 240.000 - 242.925              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 23   | 242.925 - 242.975              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 23   | 243.025 - 243.075              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 23   | 243.075 - 246.000              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 23   | 246.000 - 250.000              | Narrow | -100 / Table IV       | ✓                        | ✓  |                           |
| 23   | 385.100 - 401.100              | Narrow | -100 / Table IV       | ✓                        | ✓  |                           |
| 23   | 401.100 - 405.900              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 23   | 405.900 - 406.000              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 23   | 406.100 - 406.200              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 23   | 406.200 - 411.00               | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 23   | 411.000 - 425.000              | Narrow | -100 / Table IV       | ✓                        | ✓  |                           |
| 23   | 396.000 - 401.500              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |
| 23   | 401.500 - 401.600              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 23   | 401.700 - 401.800              | Narrow | -145 / Table IV       | ✓                        | ✓  |                           |
| 23   | 401.800 - 406.000              | Narrow | -125 / Table IV       | ✓                        | ✓  |                           |

\* All frequency ranges are to be performed with antenna in both vertical and horizontal polarization.

Unit AMSU-A2 METSAT/METOP Engineer: [Signature] 1 Dec 98  
Serial No. 106 Quality Control: [Signature] 24 DEC 98  
Shop Order 642843 Oper 0280000 Customer Representative: [Signature] 12/1/98

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Figure 1. Test Data Sheet (Sheet 3 of 3)



13:49:27 NOV 30, 1998 Antenna Horizontal PLOT 2  
RL -80.00 dBm MKR #1 FRQ 120.000 MHz

|              |                            |         |               |
|--------------|----------------------------|---------|---------------|
| *ATTEN 0 dB  | -80.00                     | -128.96 | dBm           |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |         |               |
| MARKER       | -90.00                     | UNCOR   | REF2 SAMPLE   |
| 120.000 MHz  | -100.0                     |         | AMSU-12       |
| -128.96 dBm  | -110.0                     |         | 1931200-2 EMI |
| 1            | -120.0                     |         | S/N 106       |
| VIDAUG 8     | -130.0                     |         | 50 642843     |
|              | -140.0                     |         | OP 0280000    |
|              | -150.0                     |         | JE 26121/80   |
|              | -160.0                     |         | Par 3.4.6     |
|              | -170.0                     |         |               |

START 120.000 MHz STOP 121.450 MHz  
\*RB 3.00 kHz VB 3.00 kHz ST 483.4 msec

Figure 3. Plot 2

(7D) 17:11:19 NOV 24, 1998 Antenna Horizontal  
MKR #1 FRQ 121.467 50 MHz  
PL -80.00 dBm

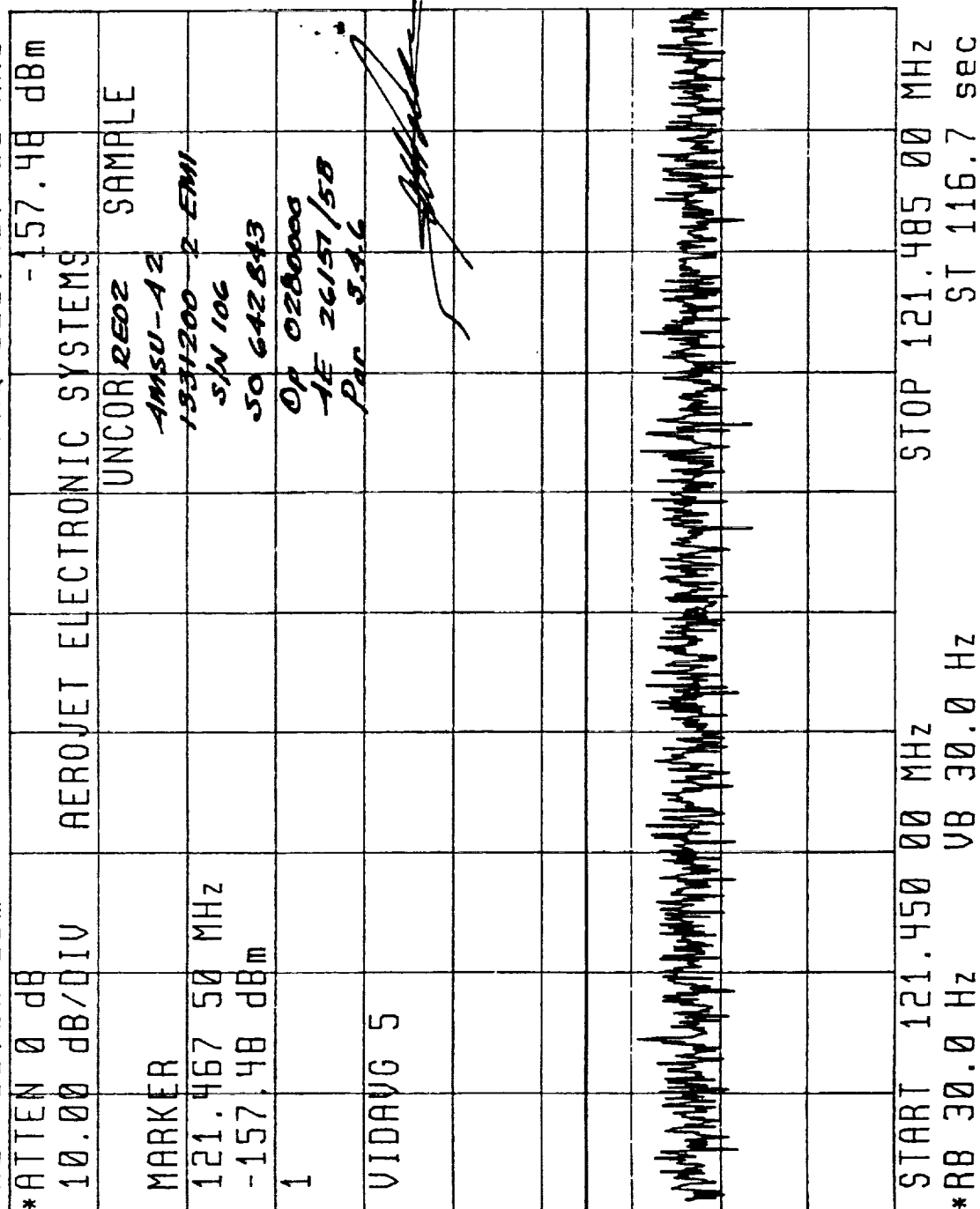


Figure 4. Plot 3

14:03:19 NOV 30, 1998 Antenna Horizontal PLOT 4  
RL -80.00 dBm MKR #1 FRQ 121.510 95 MHz

|                |                            |       |               |
|----------------|----------------------------|-------|---------------|
| *ATTEN 0 dB    | -80.00                     |       | -152.07 dBm   |
| 10.00 dB/DIV   | AEROJET ELECTRONIC SYSTEMS |       |               |
| MARKER         | -90.00                     | UNCOR | RE02 SAMPLE   |
| 121.510 95 MHz |                            |       | AMSU-42       |
| -152.07 dBm    | -100.0                     |       | 1331200-2 ENI |
| 1              | -110.0                     |       | S/N 106       |
| VIDAUG 7       | -120.0                     |       | 50 642843     |
|                | -130.0                     |       | Op 02800000   |
|                | -140.0                     |       | AE 26151/50   |
|                | -150.0                     |       | Par 5.4.6     |
|                | -160.0                     |       |               |
|                | -170.0                     |       |               |

CENTER 121.500 00 MHz SPAN 30.00 kHz  
\*RB 30.0 Hz VB 30.0 Hz ST 100.0 sec

-150  
dBm

Figure 5. Plot 4

PLOT 5

Antenna Horizontal

NOV 30, 1998

14:14:59

RL -80.00 dBm MKR #1 FRQ 121.537 49 MHz

|                |                            |             |
|----------------|----------------------------|-------------|
| *ATTEN 0 dB    | -80.00                     | -151.04 dBm |
| 10.00 dB/DIV   | AEROJET ELECTRONIC SYSTEMS |             |
| MARKER         | RE02 SAMPLE                |             |
| 121.537 49 MHz | ANSU-A2                    |             |
| -151.04 dBm    | 1331200-2 EMI              |             |
| 1              | S/N 106                    |             |
|                | SO CA2843                  |             |
|                | Op 0280000                 |             |
|                | AE 26151/50                |             |
|                | Par 3.4.6                  |             |
| VIDAUG 5       |                            |             |
|                | -100.0                     |             |
|                | -110.0                     |             |
|                | -120.0                     |             |
|                | -130.0                     |             |
|                | -140.0                     |             |
|                | -150.0                     |             |
|                | -160.0                     |             |
|                | -170.0                     |             |

-145  
dBm

START 121.515 00 MHz STOP 121.550 00 MHz  
\*RB 30.0 Hz VB 30.0 Hz ST 116.7 sec

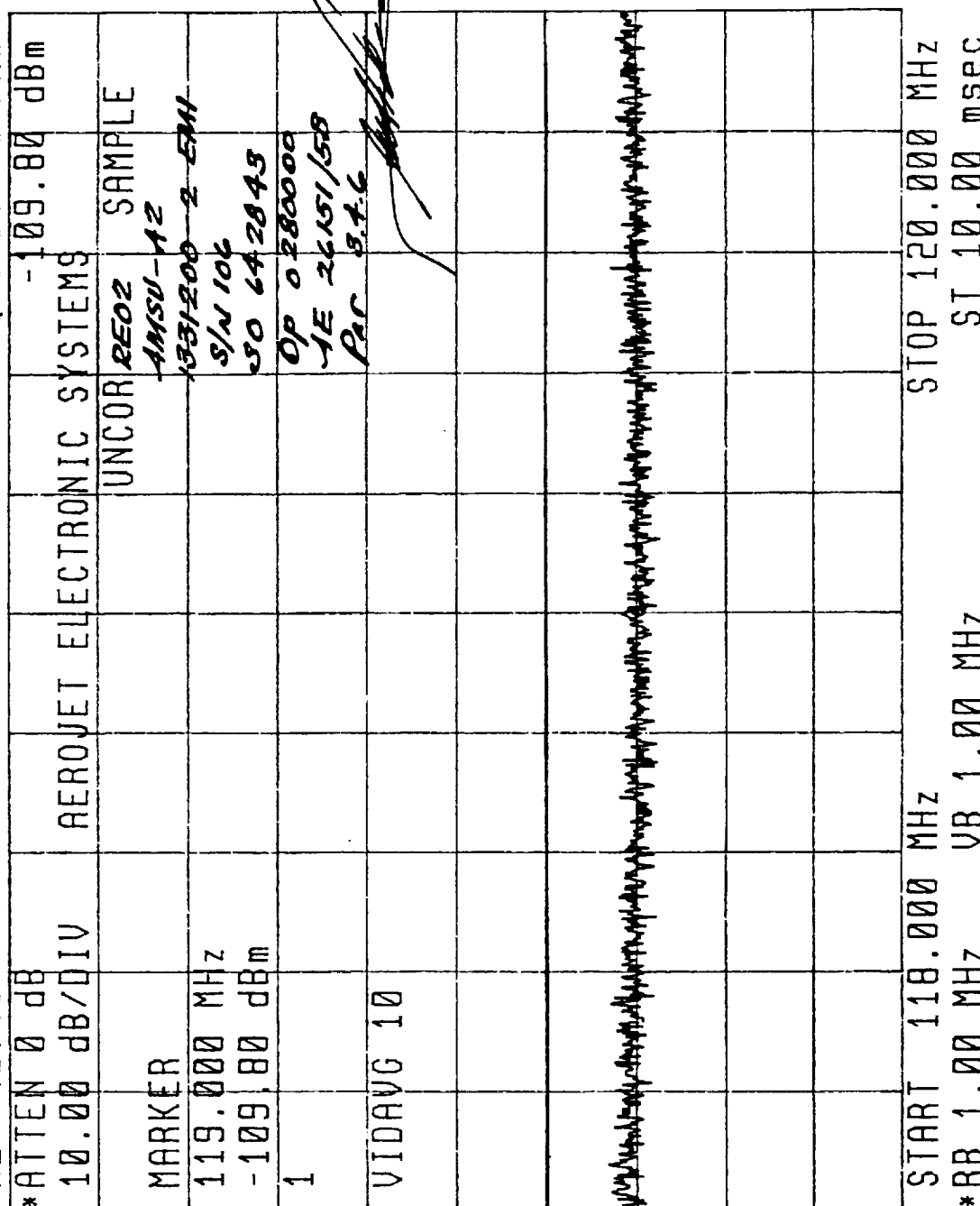
Figure 6. Plot 5







18:17:09 NOV 24, 1998 *Antenna Vertical* *PLOT 8*  
 RL -40.00 dBm MKR #1 FRQ 119.000 MHz



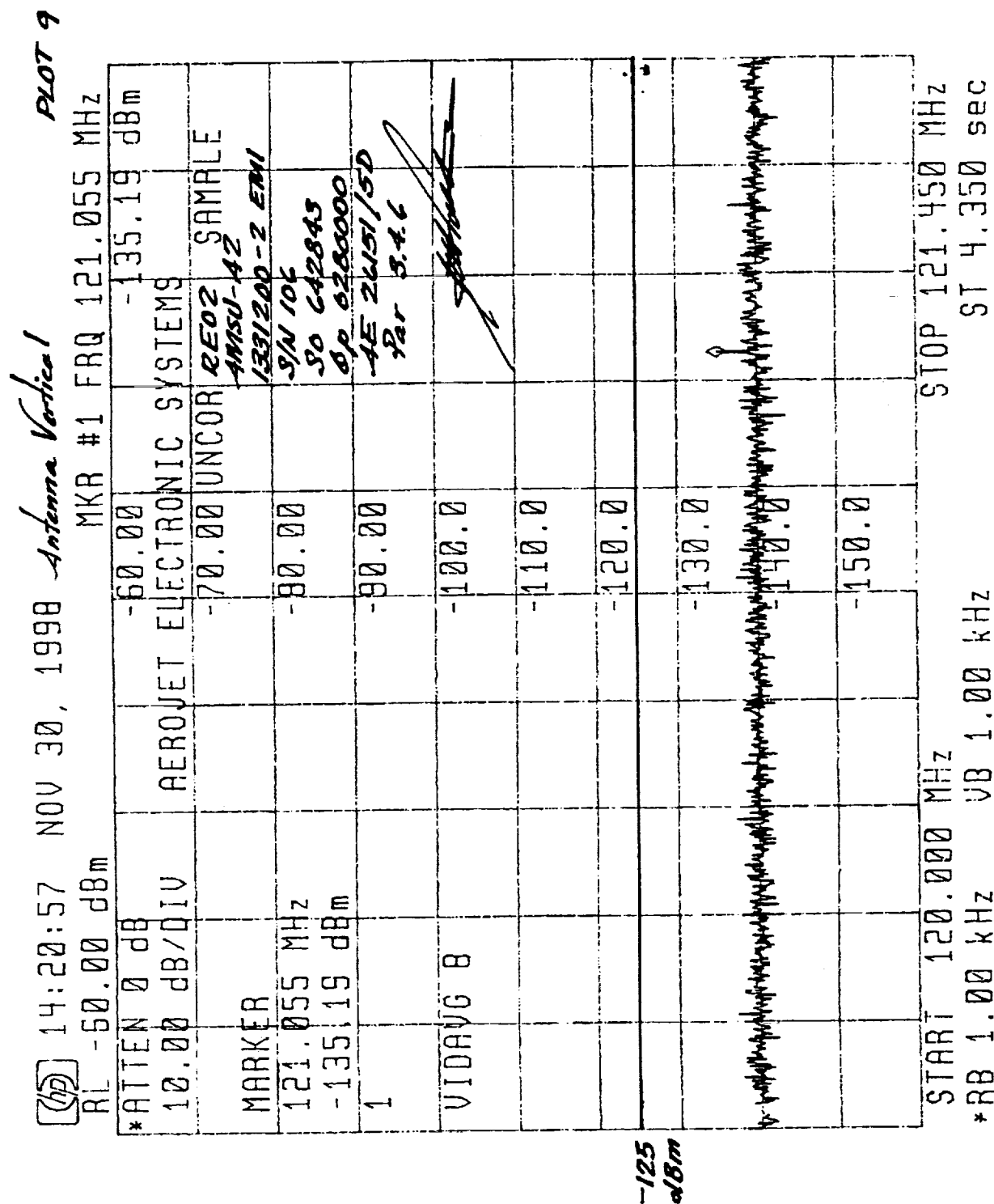


Figure 10. Plot 9

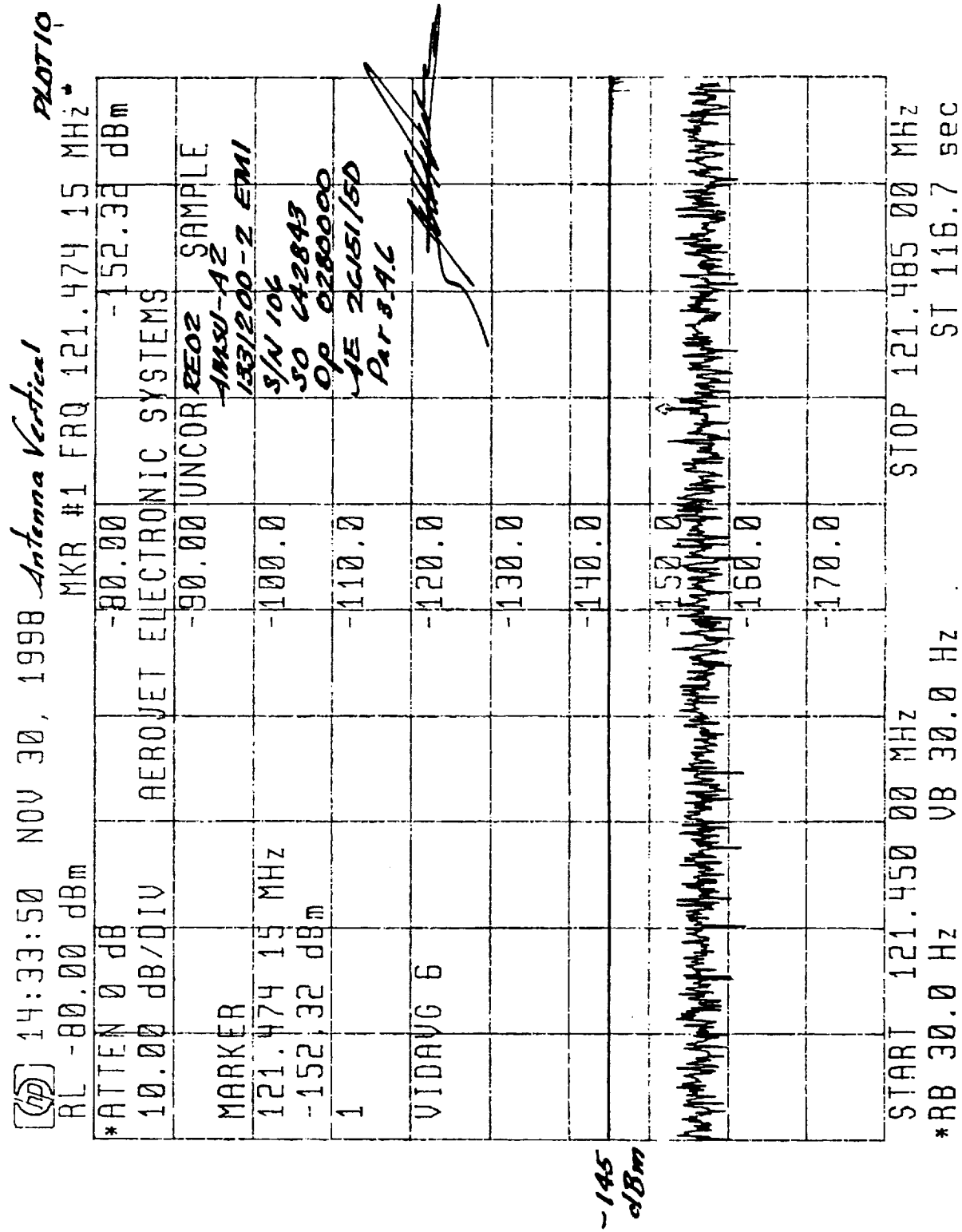


Figure 11. Plot 10

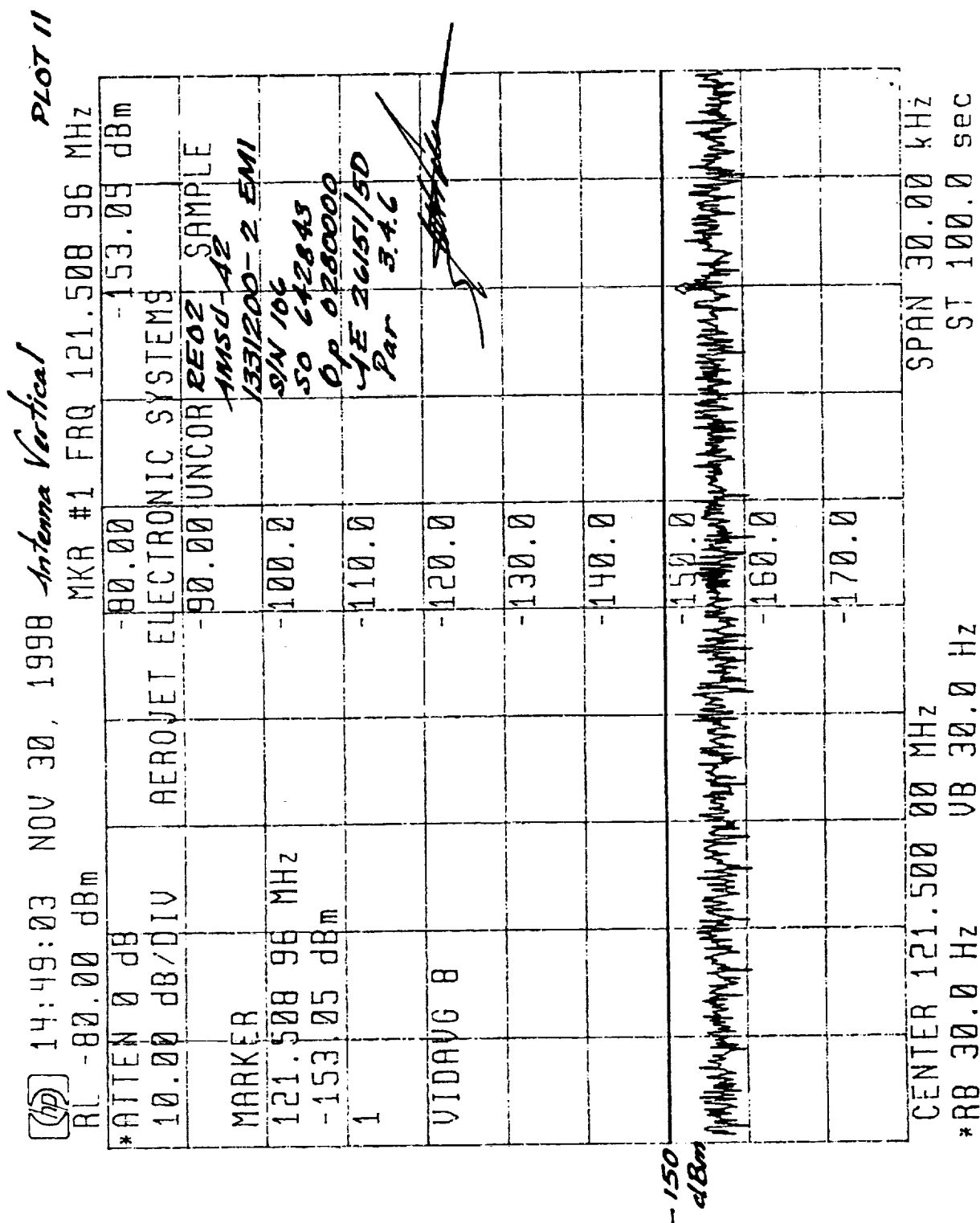


Figure 12. Plot 11

PLOT 12

Antenna Vertical

NOV 30, 1998

15:04:32

MKR #1 FRQ 121.537 49 MHz

RL -80.00 dBm

|                |                            |               |        |
|----------------|----------------------------|---------------|--------|
| *ATTEN 0 dB    | -80.00                     | -151.39       | dBm    |
| 10.00 dB/DIV   | AEROJET ELECTRONIC SYSTEMS |               |        |
| MARKER         | -90.00                     | UNCOR RE02    | SAMPLE |
| 121.537 49 MHz |                            | 1MSU-A2       |        |
| -151.39 dBm    | -100.0                     | 1331200-2 EMI |        |
| 1              | -110.0                     | S/N 106       |        |
| VIDAUG 7       | -120.0                     | 30 642843     |        |
|                | -130.0                     | 02 0280000    |        |
|                | -140.0                     | AE 26157/50   |        |
|                | -150.0                     | Par 3.4.6     |        |
|                | -160.0                     |               |        |
|                | -170.0                     |               |        |

START 121.515 00 MHz STOP 121.550 00 MHz  
\*RB 30.0 Hz VB 30.0 Hz ST 116.7 sec

-145  
dBm

Figure 13. Plot 12

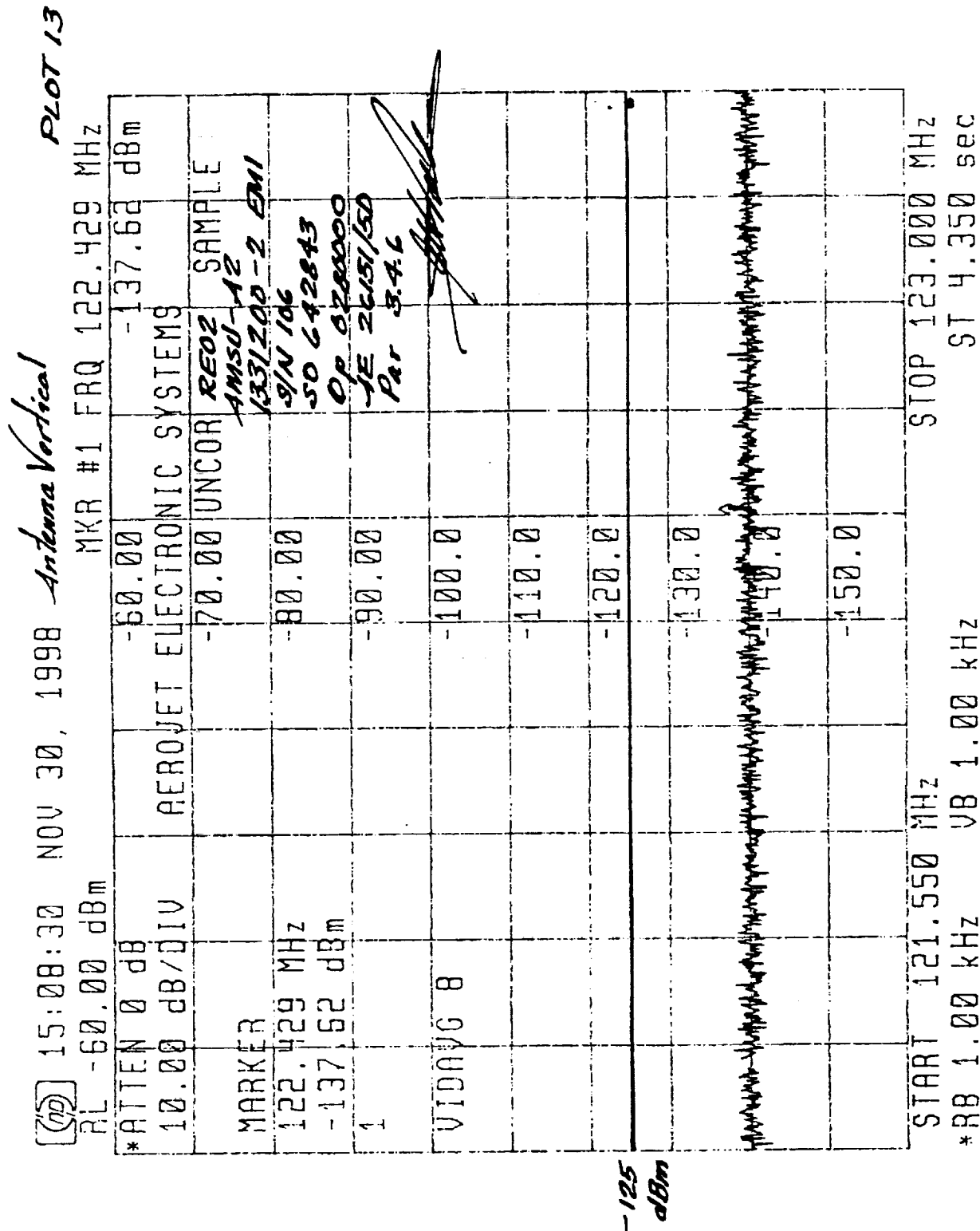


Figure 14. Plot 13

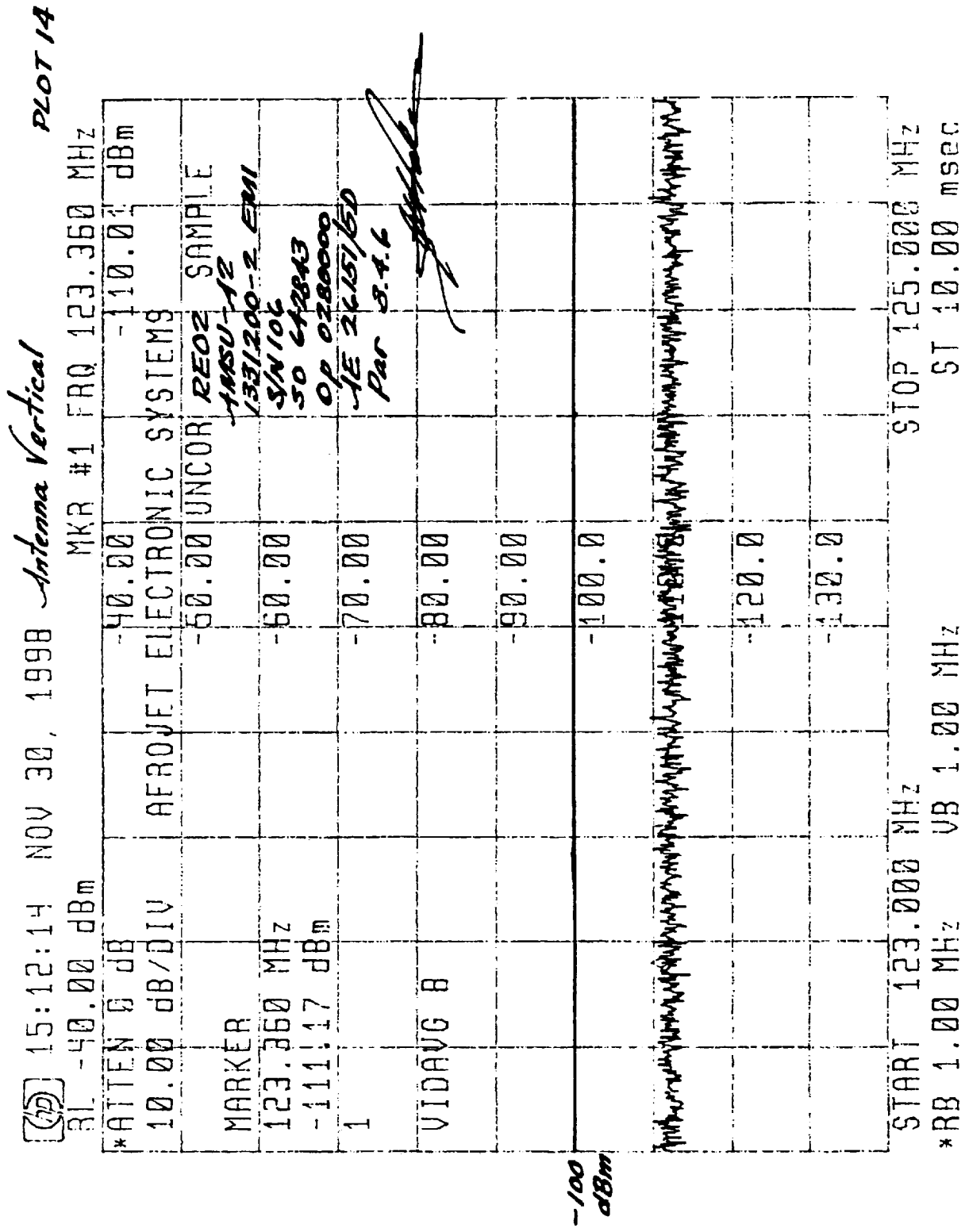


Figure 15. Plot 14

Plot 15

Antenna Horizontal

NOV 25, 1998

09:52:56

10.00 dB/DIV

MKR #1 FRQ 237.970 MHz

RL -80.00 dBm

| *ATTEN 0 dB  | -80.00                     | -129.32 dBm   |
|--------------|----------------------------|---------------|
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |               |
| MARKER       | UNCOR                      | REO2 SAMPLE   |
| 237.970 MHz  |                            | AMSU-A2       |
| -129.32 dBm  | -100.0                     | 1501200-2-EMI |
| 1            | -110.0                     | 5/4/06        |
|              | -120.0                     | SO 642843     |
|              | -130.0                     | Op 0200000    |
|              | -150.0                     | AE 24151/50   |
|              | -160.0                     | Par. 3.4.6    |
|              | -170.0                     |               |

START 236.000 MHz  
\*RB 1.00 kHz VB 1.00 kHz

STOP 240.000 MHz  
ST 12.00 sec

100 dBm

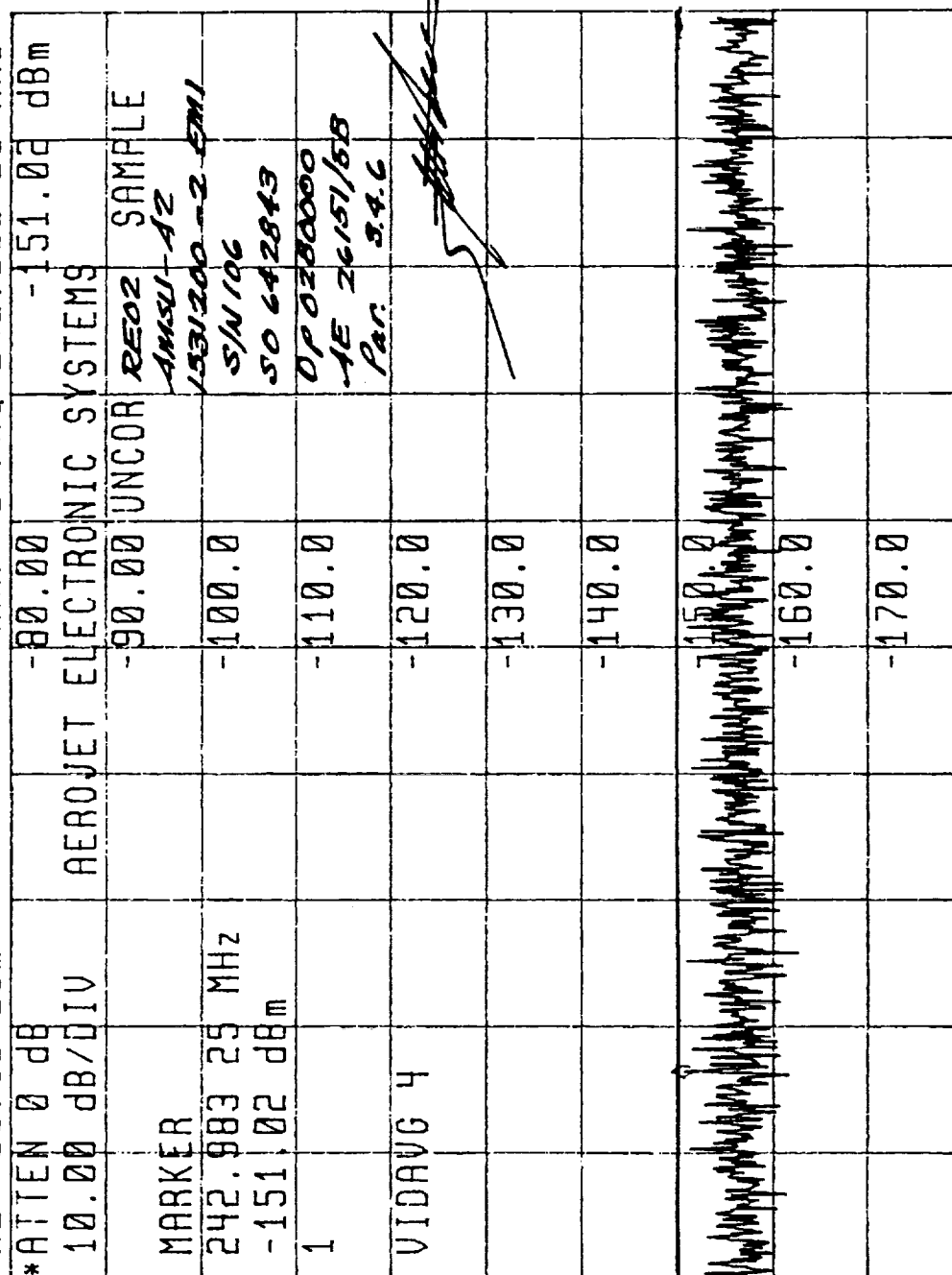
Figure 16. Plot 15







(hp) 10:28:12 NOV 25, 1998 Antenna Horizontal PLOT 18  
 RL -80.00 dBm MKR #1 FRQ 242.983 25 MHz



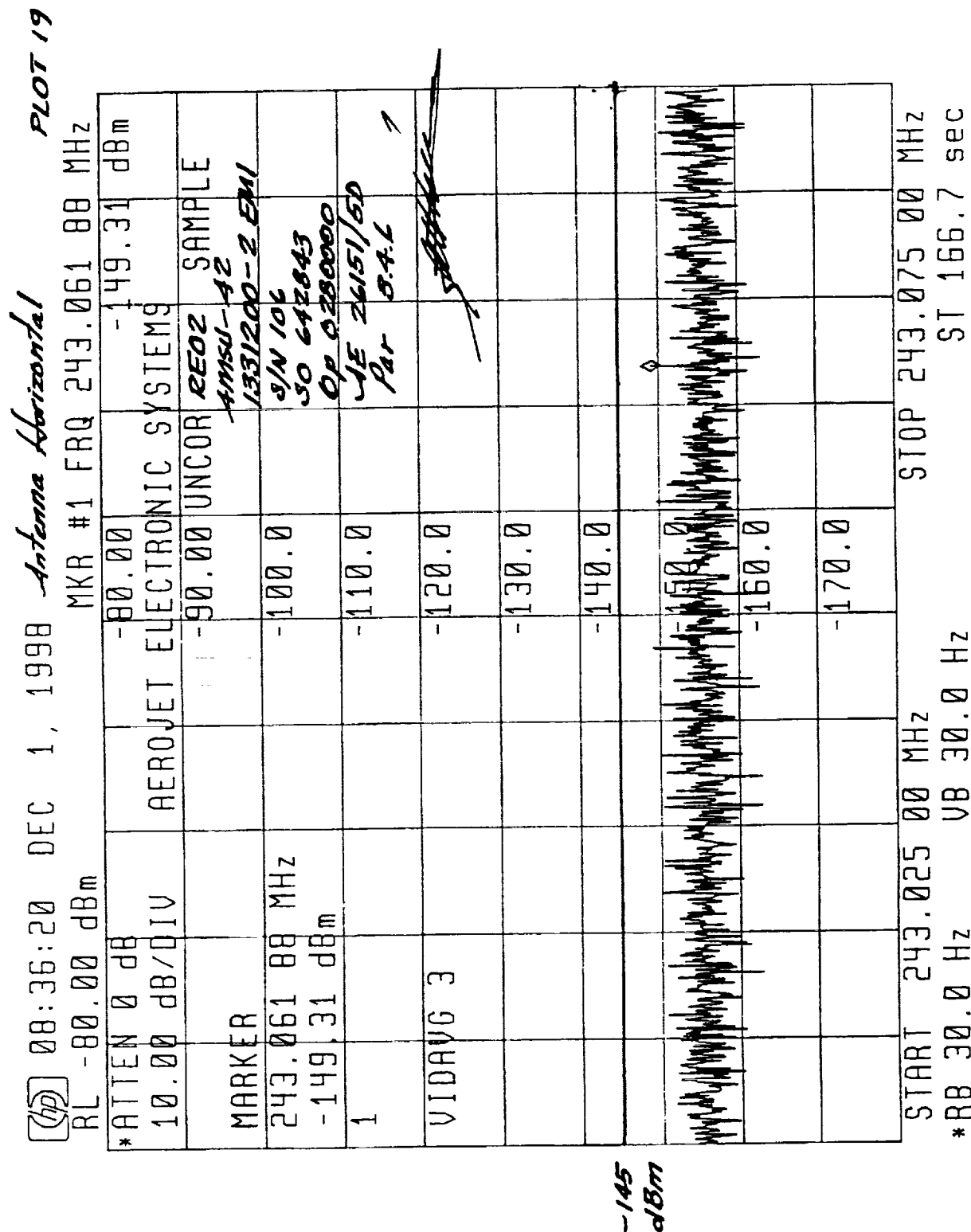


Figure 20. Plot 19

11:06:54 NOV 25, 1998 Antenna Horizontal Plot 20  
RL -80.00 dBm MKR #1 FRQ 243.287 MHz

| *ATTEN 0 dB  | AEROJET ELECTRONIC SYSTEMS | -80.00  | -142.22 dBm   |
|--------------|----------------------------|---------|---------------|
| 10.00 dB/DIV |                            |         |               |
| MARKER       |                            | -80.00  | SAMPLE        |
| 243.287 MHz  |                            |         | AMSU-A2       |
| -142.22 dBm  |                            | -100.00 | 1331200-2 FMI |
| 1            |                            | -110.00 | 5/N106        |
|              |                            |         | 50 642843     |
|              |                            |         | Op 0280000    |
|              |                            |         | AE 20151/58   |
|              |                            |         | Par. 34.6     |
| VIDAUG 8     |                            | -120.00 |               |
|              |                            | -130.00 |               |
|              |                            | -150.00 |               |
|              |                            | -160.00 |               |
|              |                            | -170.00 |               |

START 243.075 MHz STOP 246.000 MHz  
\*RB 1.00 kHz VB 1.00 kHz ST 8.775 sec

-125 dBm  
Figure 21. Plot 20

11:19:24 NOV 25, 1998 Antenna Horizontal **PLOT 21**  
RL -40.00 dBm MKR #1 FRQ 246.440 MHz

|              |                            |               |
|--------------|----------------------------|---------------|
| *ATTEN 0 dB  | -40.00                     | -110.69 dBm   |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |               |
| MARKER       | -50.00 UNCOR               | REO2 SAMPLE   |
| 246.440 MHz  |                            | ANISU-A2      |
| -110.69 dBm  | -50.00                     | 1831200 2-EM1 |
| 1            | -50.00                     | S/N 106       |
|              | -70.00                     | 50 642843     |
| VIDAUG 8     | -80.00                     | Op 0280000    |
|              | -80.00                     | AE 26151/58   |
|              | -80.00                     | PER 3.4.6     |
|              | -100.0                     |               |
|              | -120.0                     |               |
|              | -130.0                     |               |

START 246.000 MHz STOP 250.000 MHz  
\*RB 1.00 MHz VB 1.00 MHz ST 10.00 msec

-100  
dBm

Figure 22. Plot 21

15:40:42 NOV 25, 1998 Antenna Vertical PLOT 22  
RL -40.00 dBm MKR #1 FRQ 239.990 MHz

|              |                            |         |               |
|--------------|----------------------------|---------|---------------|
| *ATTEN 0 dB  | -40.00                     | -106.43 | dBm           |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |         |               |
| MARKER       | -50.00                     | UNCOR   | RE02 SAMPLE   |
| 239.990 MHz  |                            |         | AMSU-A2       |
| -106.43 dBm  | -60.00                     |         | 1331200-2 EMI |
| 1            |                            |         | S/N 106       |
|              | -70.00                     |         | 50 642843     |
| VIDAUG 8     | -80.00                     |         | Op 02800000   |
|              | -90.00                     |         | AE 26151/58   |
|              | -100.0                     |         | Par 5.4.6     |
|              | -110.0                     |         |               |
|              | -130.0                     |         |               |

START 236.000 MHz STOP 240.000 MHz  
\*RB 30.0 kHz VB 30.0 kHz ST 13.36 msec

Figure 23. Plot 22

PLOT 23

Antenna Vertical

NOV 25, 1998

15:49:42  
RL -80.00 dBm

MKR #1 FRQ 240.004 MHz

|              |        |                            |               |
|--------------|--------|----------------------------|---------------|
| *ATTEN 0 dB  | -80.00 | AEROJET ELECTRONIC SYSTEMS | -126.24 dBm   |
| 10.00 dB/DIV | -90.00 | UNCOR                      | RE02 SAMPLE   |
| MARKER       | -100.0 |                            | AMSU-A2       |
| 240.004 MHz  | -110.0 |                            | 1331200-2 EN1 |
| -126.24 dBm  | -120.0 |                            | S/N 106       |
| 1            | -130.0 |                            | 50 642843     |
| VIDAVG 8     | -150.0 |                            | OP 02800000   |
|              | -160.0 |                            | AE 26151/50   |
|              | -170.0 |                            | Par 5.4.6     |

-125  
dBm

Figure 24. Plot 23

START 240.000 MHz  
\*RB 1.00 kHz VB 1.00 kHz  
STOP 242.925 MHz  
ST 8.775 sec





PILOT 25

Antenna Vertical

DEC 1, 1998

09:03:56

MKR #1 FRQ 242.983 13 MHz

RL -80.00 dBm

| *ATTEN 0 dB    | AEROJET ELECTRONIC SYSTEMS | -80.00 | -151.24 dBm   |
|----------------|----------------------------|--------|---------------|
| 10.00 dB/DIV   | UNCOR                      | -90.00 | SAMPLE        |
| MARKER         |                            |        |               |
| 242.983 13 MHz |                            | -100.0 | 1331200-2 ENI |
| -151.24 dBm    |                            |        | S/N 104       |
| 1              |                            | -110.0 | 50 642843     |
|                |                            |        | Op 0280000    |
|                |                            | -120.0 | 4E 26151/50   |
| VIDAUG 8       |                            |        | Par. 5.4.6    |
|                |                            | -130.0 |               |
|                |                            | -140.0 |               |
|                |                            | -150.0 |               |
|                |                            | -160.0 |               |
|                |                            | -170.0 |               |

SPAN 50.00 kHz

ST 166.7 sec

CENTER 243.000 00 MHz

VB 30.0 Hz

\*RB 30.0 Hz

-150  
dBm

Figure 26. Plot 25

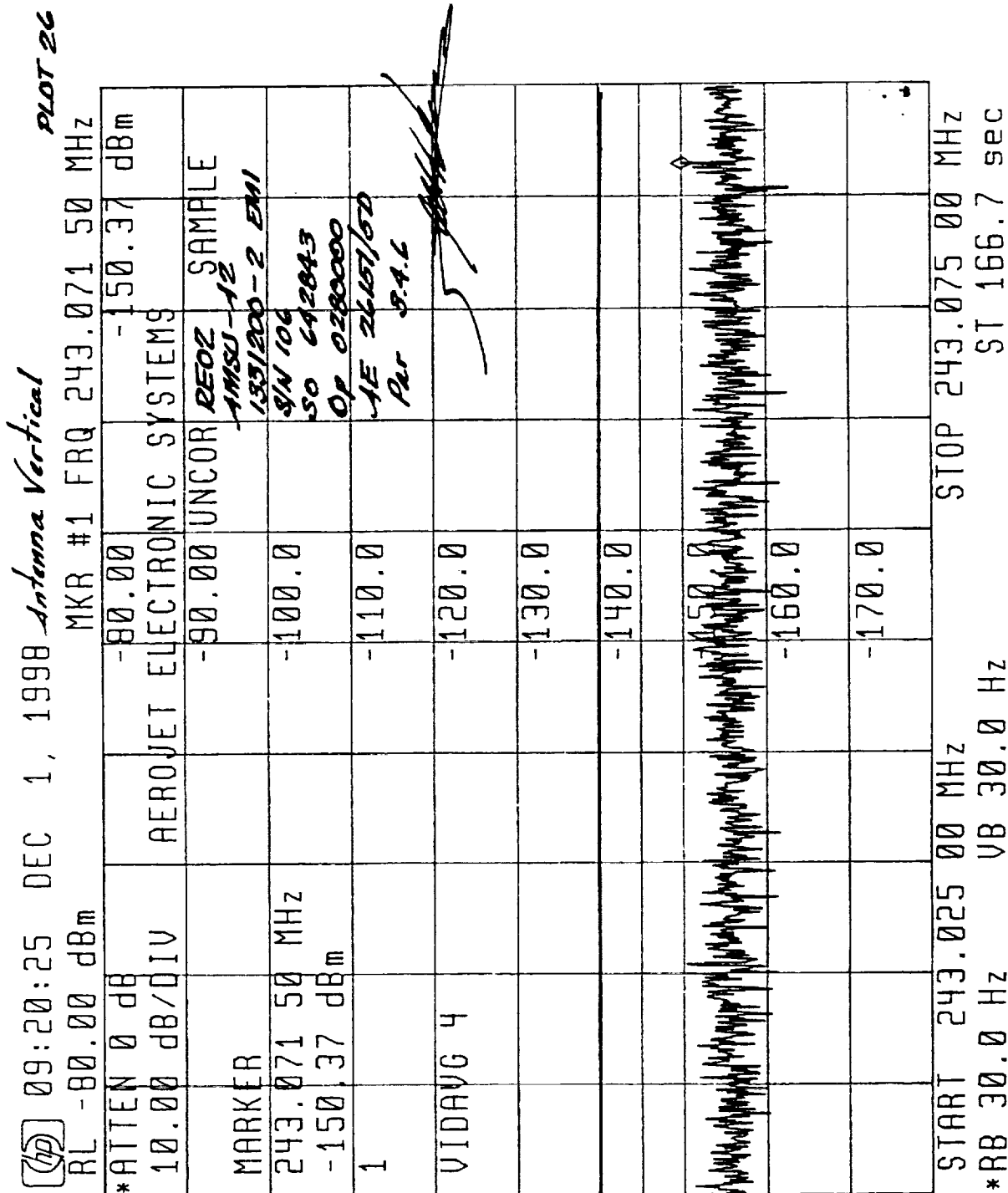


Figure 27. Plot 26

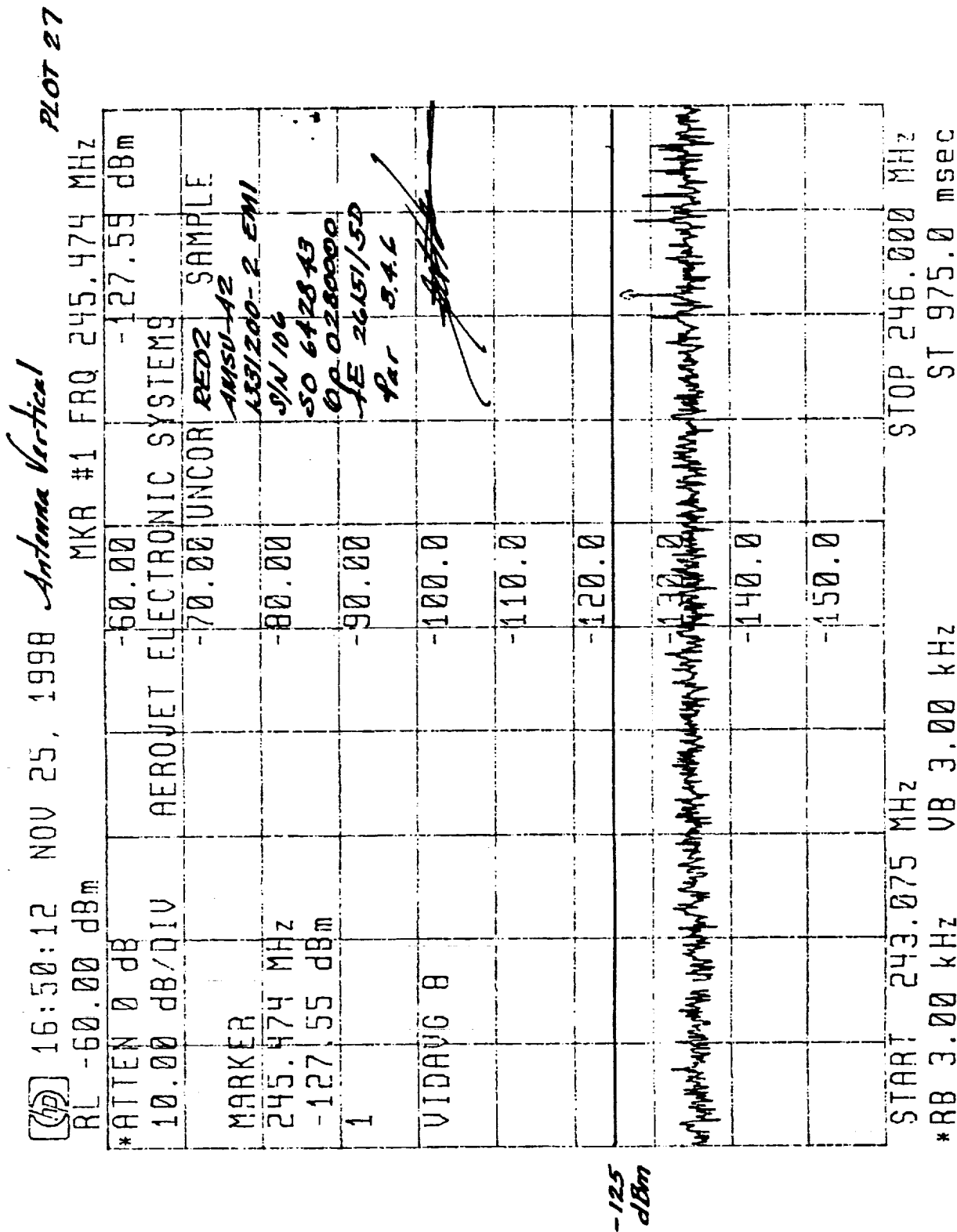
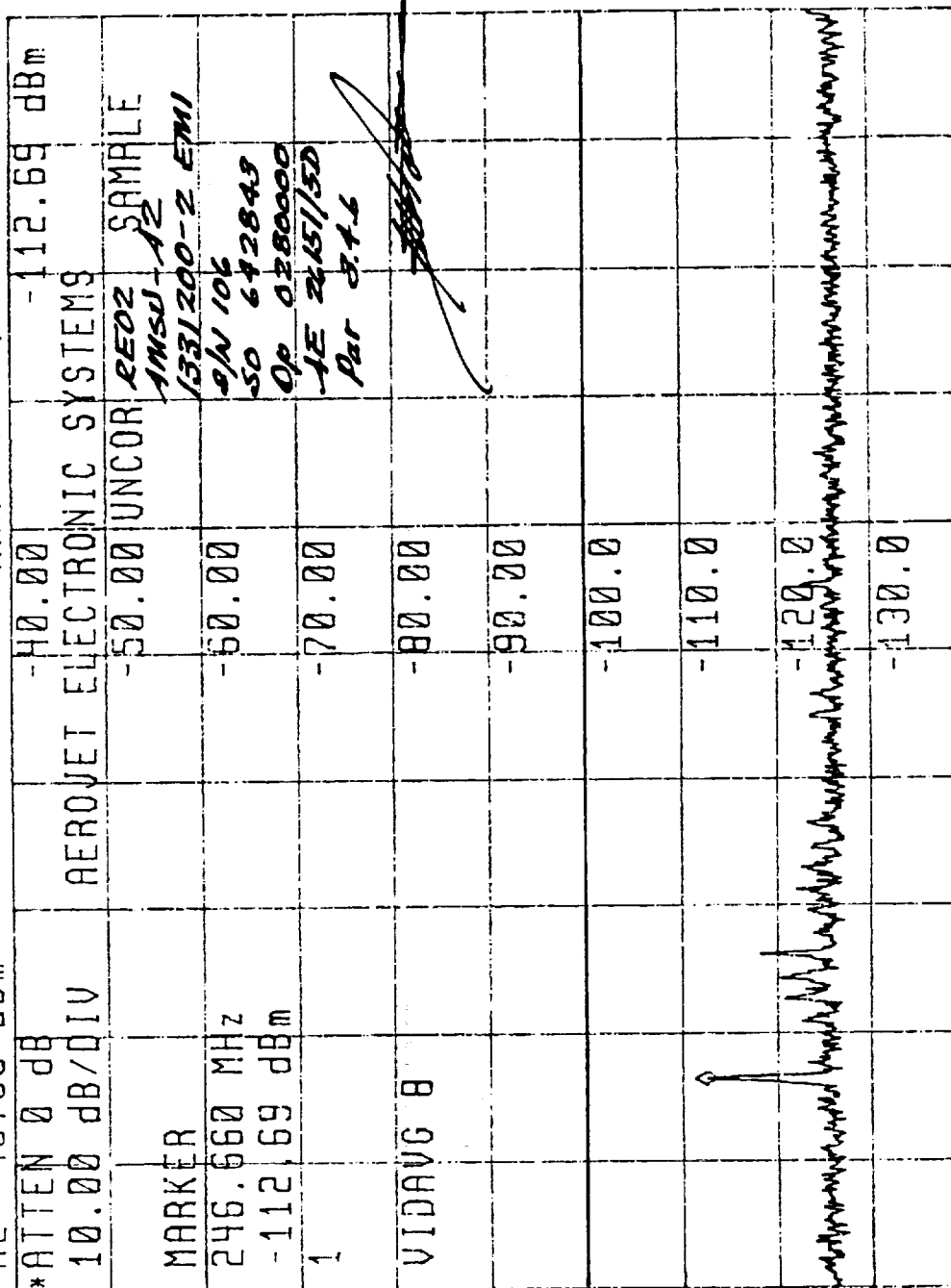


Figure 28. Plot 27

[Qp] 16:59:09 NOV 25, 1998 Antenna Vertical PLOT 28  
RL -40.00 dBm MKR #1 FRQ 246.660 MHz



-100  
dBm

Figure 29. Plot 28

11:25:04 NOV 25, 1998 Antenna Horizontal PLOT 29

RL -40.00 dBm MKR #1 FRQ 400.10 MHz

|              |                            |       |                 |        |
|--------------|----------------------------|-------|-----------------|--------|
| *ATTEN 0 dB  | -40.00                     |       | -111.41         | dBm    |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |       |                 |        |
| MARKER       | -50.00                     | UNCOR | REOZ            | SAMPLE |
| 400.10 MHz   |                            |       | AMSU-A2         |        |
| -111.41 dBm  | -60.00                     |       | 1331200 - 2 EMI |        |
| 1            |                            |       | 3/4 106         |        |
| VIDAUG B     | -70.00                     |       | 50 642843       |        |
|              | -80.00                     |       | Op 0280000      |        |
|              | -90.00                     |       | AE 26151/50     |        |
|              | -100.0                     |       | Par. 34.6       |        |
|              | -120.0                     |       |                 |        |
|              | -130.0                     |       |                 |        |

START 385.10 MHz STOP 401.10 MHz  
\*RB 1.00 MHz VB 1.00 MHz ST 10.00 msec

-100  
dBm

Figure 30. Plot 29

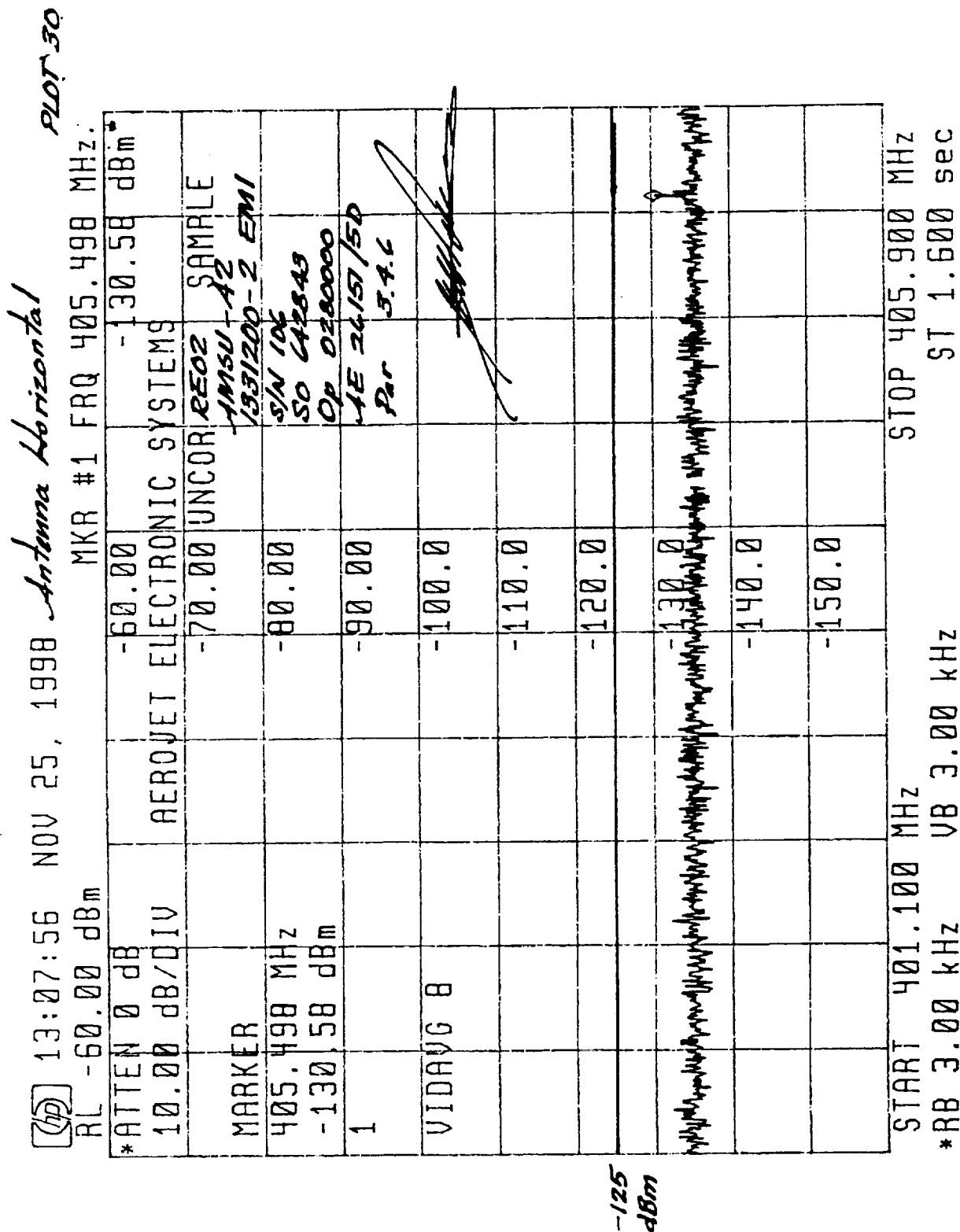


Figure 31. Plot 30





PLOT 32

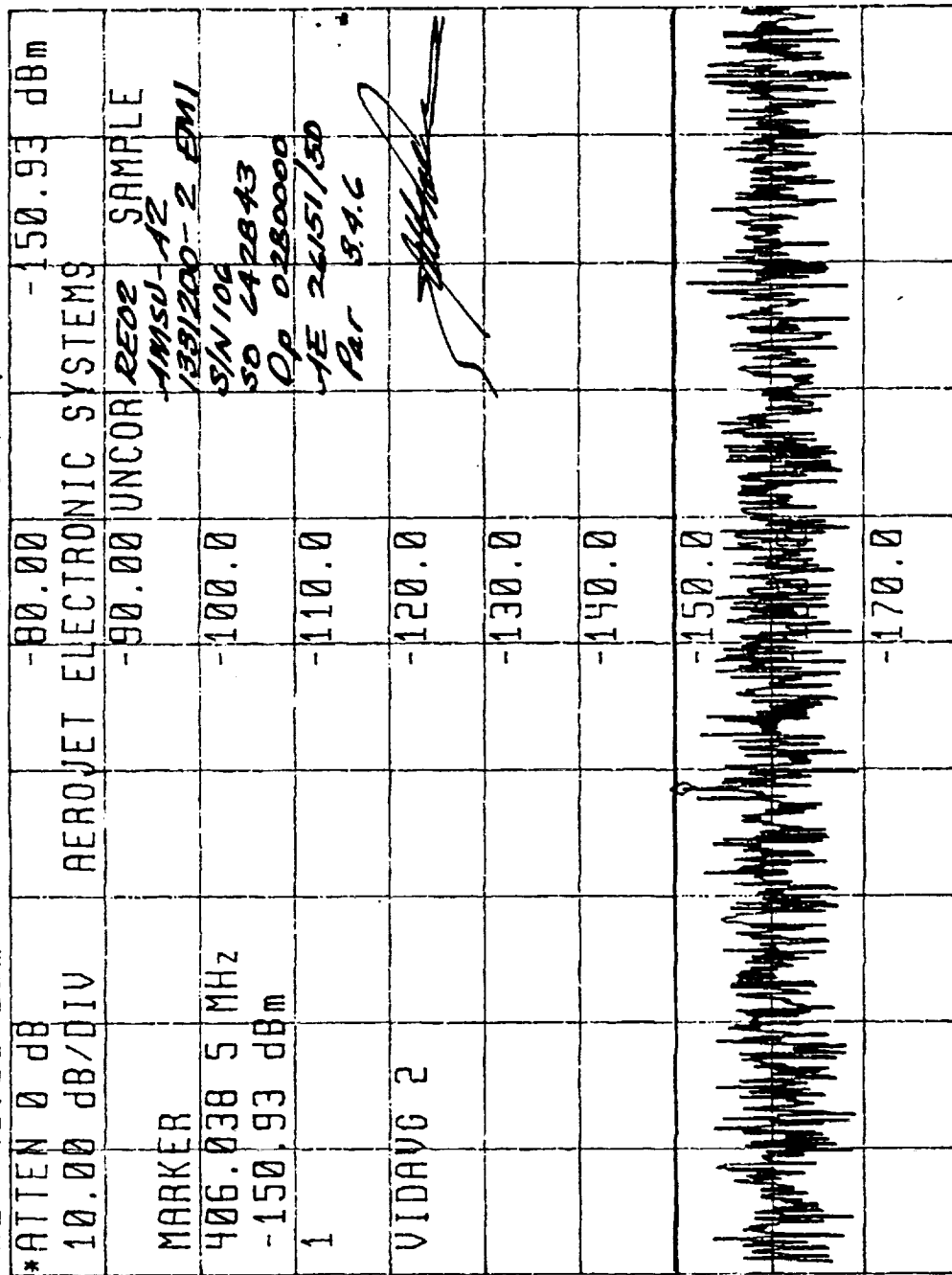
Antenna Horizontal

NOV 25, 1998

13:50:55

MKR #1 FRQ 406.038 5 MHz

RL -80.00 dBm

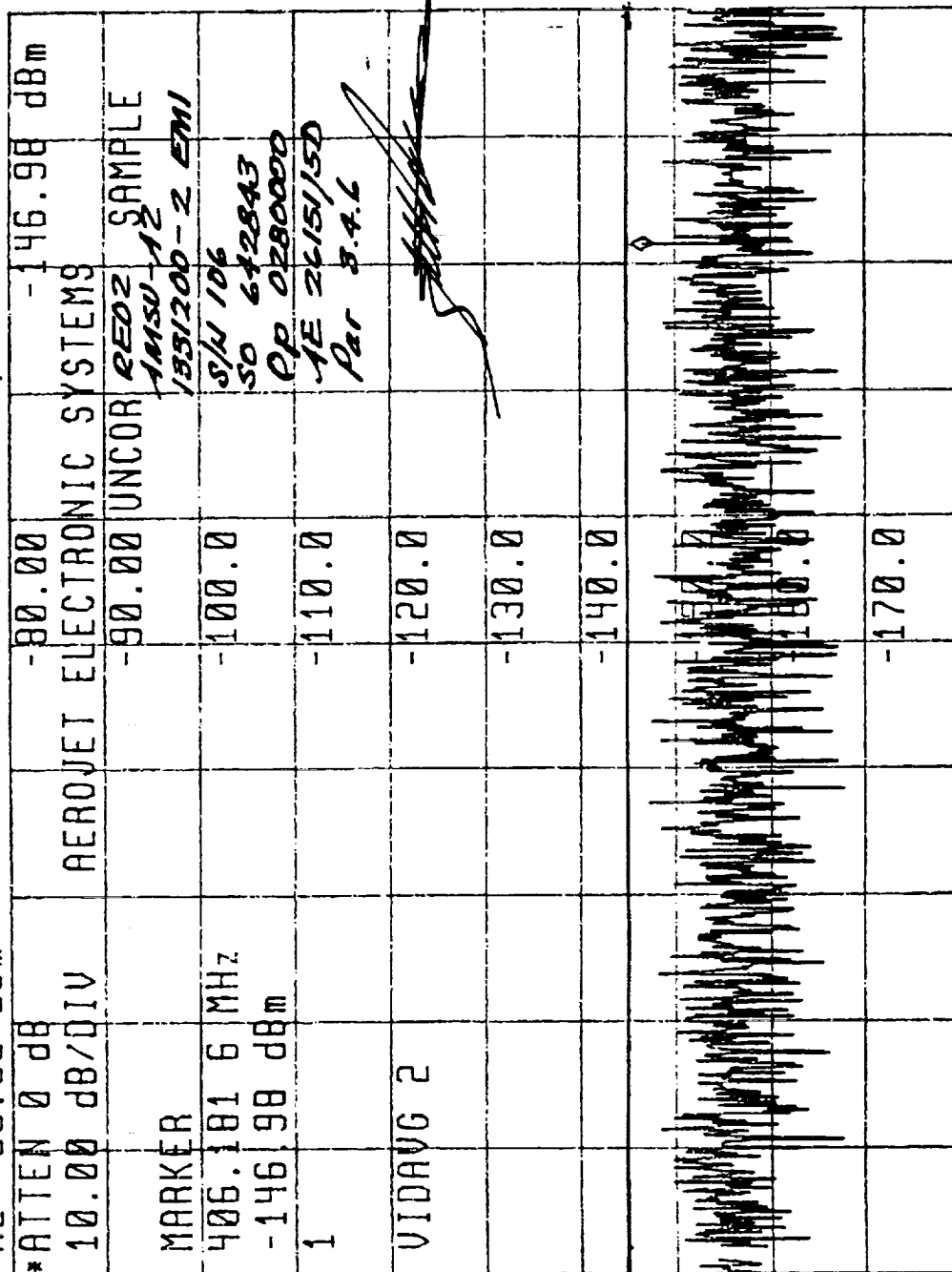


CENTER 406.050 0 MHz  
\*RB 10.0 Hz  
SPAN 100.0 kHz  
ST 1.000 ksec

-150  
dBm

Figure 33. Plot 32

14:04:01 NOV 25, 1998 *Antenna horizontal* *PLOT 33*  
 RL -80.00 dBm MKR #1 FRQ 406.101 6 MHz



14:13:28 NOV 25, 1998 Antenna Horizontal PLOT 34  
RL -80.00 dBm MKR #1 FRQ 406.656 MHz

| *ATTEN 0 dB  | AEROJET ELECTRONIC SYSTEMS | -80.00       | -128.07 dBm   |
|--------------|----------------------------|--------------|---------------|
| 10.00 dB/DIV |                            |              |               |
| MARKER       |                            | -90.00 UNCOR | REDZ SAMALE   |
| 406.656 MHz  |                            |              | MSW-AZ        |
| -128.07 dBm  |                            | -100.0       | 1331200-2 AMI |
| 1            |                            |              | S/N 106       |
|              |                            | -110.0       | SD 642843     |
|              |                            |              | Op 0280000    |
|              |                            | -120.0       | 4E 26151 GSD  |
| VIDAVG 8     |                            |              | Par 8.41      |
|              |                            | -130.0       |               |
|              |                            | -140.0       |               |
|              |                            | -150.0       |               |
|              |                            | -160.0       |               |
|              |                            | -170.0       |               |

START 406.200 MHz STOP 411.000 MHz  
\*RB 3.00 kHz VB 3.00 kHz ST 1.600 sec

-125 dBm  
Figure 35. Plot 34



17:03:44 NOV 25, 1998 *Antenna Vertical* **PLOT 36**  
 RL -40.00 dBm MKR #1 FRQ 399.98 MHz

|              |                            |                      |             |
|--------------|----------------------------|----------------------|-------------|
| *ATTEN 0 dB  | -40.00                     |                      | -122.43 dBm |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |                      |             |
| MARKER       | -50.00 UNCOR               | RE02 SAMPLE          |             |
| 399.98 MHz   |                            | <i>AMSU-A2</i>       |             |
| -122.43 dBm  | -50.00                     | <i>1331200-2 ENI</i> |             |
| 1            | -70.00                     | <i>S/N 100</i>       |             |
| VIDAUG 8     | -80.00                     | <i>50 642843</i>     |             |
|              | -90.00                     | <i>Op 0280000</i>    |             |
|              | -100.00                    | <i>AE 26151/50</i>   |             |
|              | -110.00                    | <i>Pu 3.4.6</i>      |             |
|              | -120.00                    |                      |             |
|              | -130.00                    |                      |             |

START 385.10 MHz STOP 401.10 MHz;  
 \*RB 10.0 kHz VB 10.0 kHz ST 400.0 msec

Figure 37. Plot 36 <sup>-100 dBm</sup>

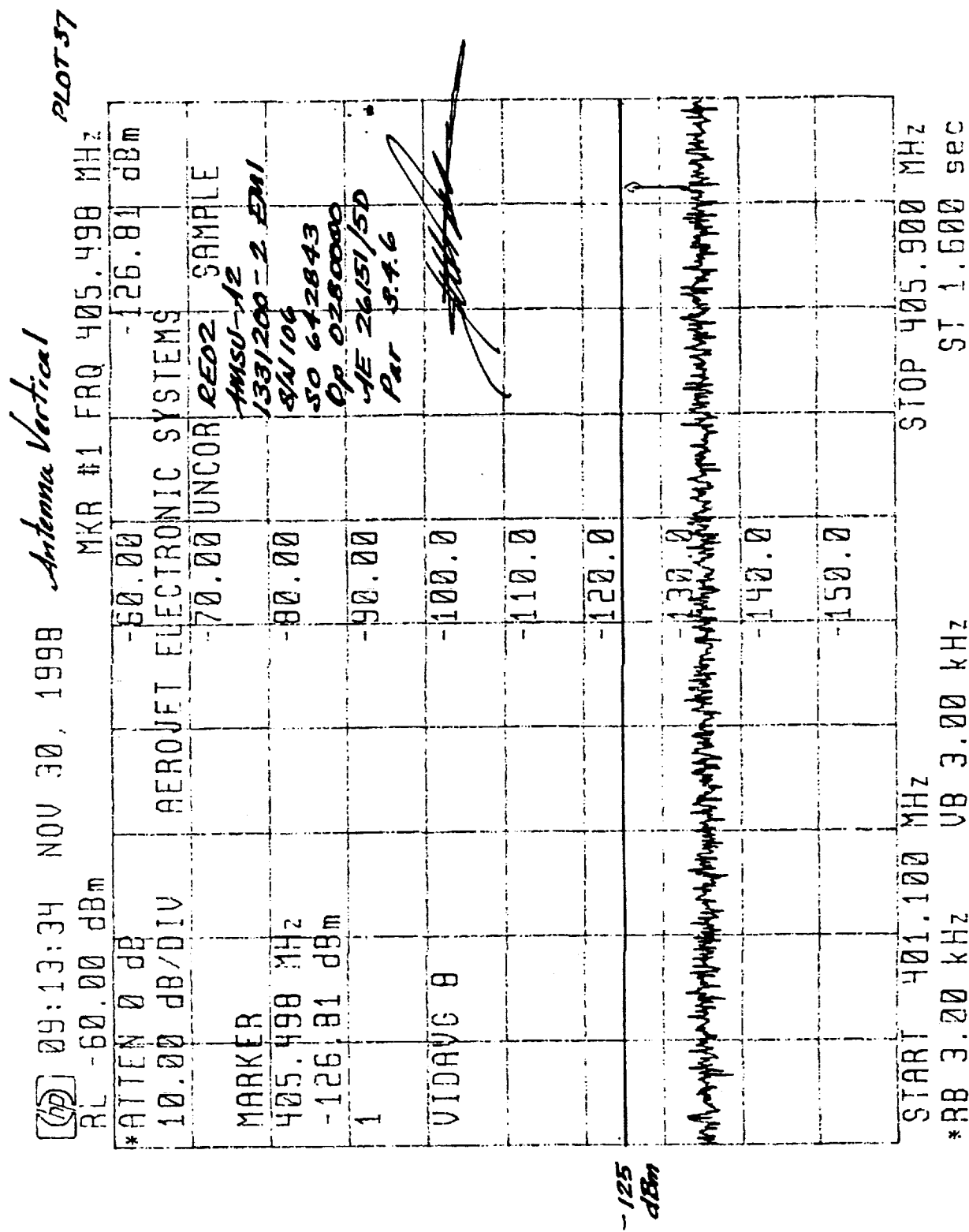


Figure 38. Plot 37



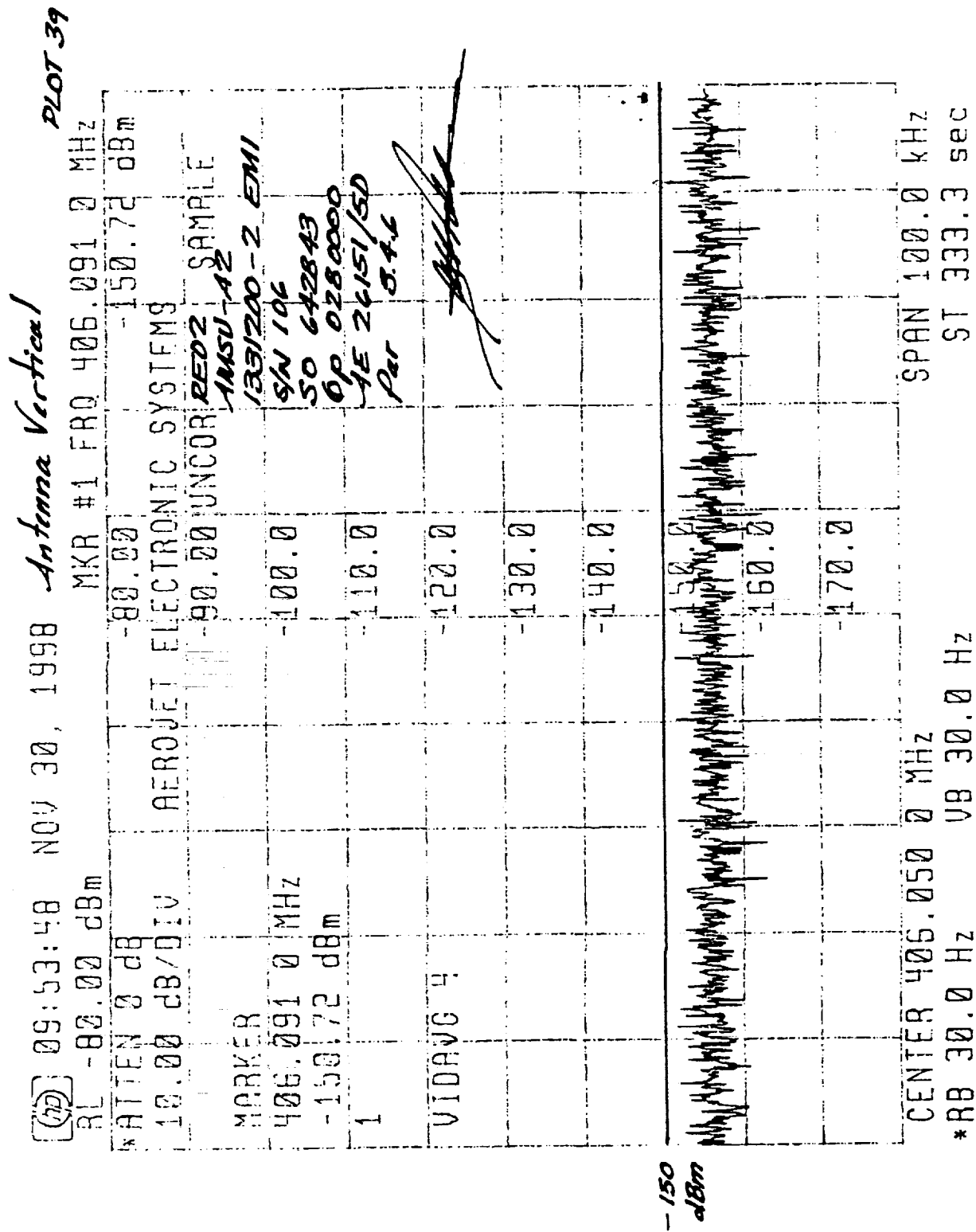


Figure 40. Plot 39



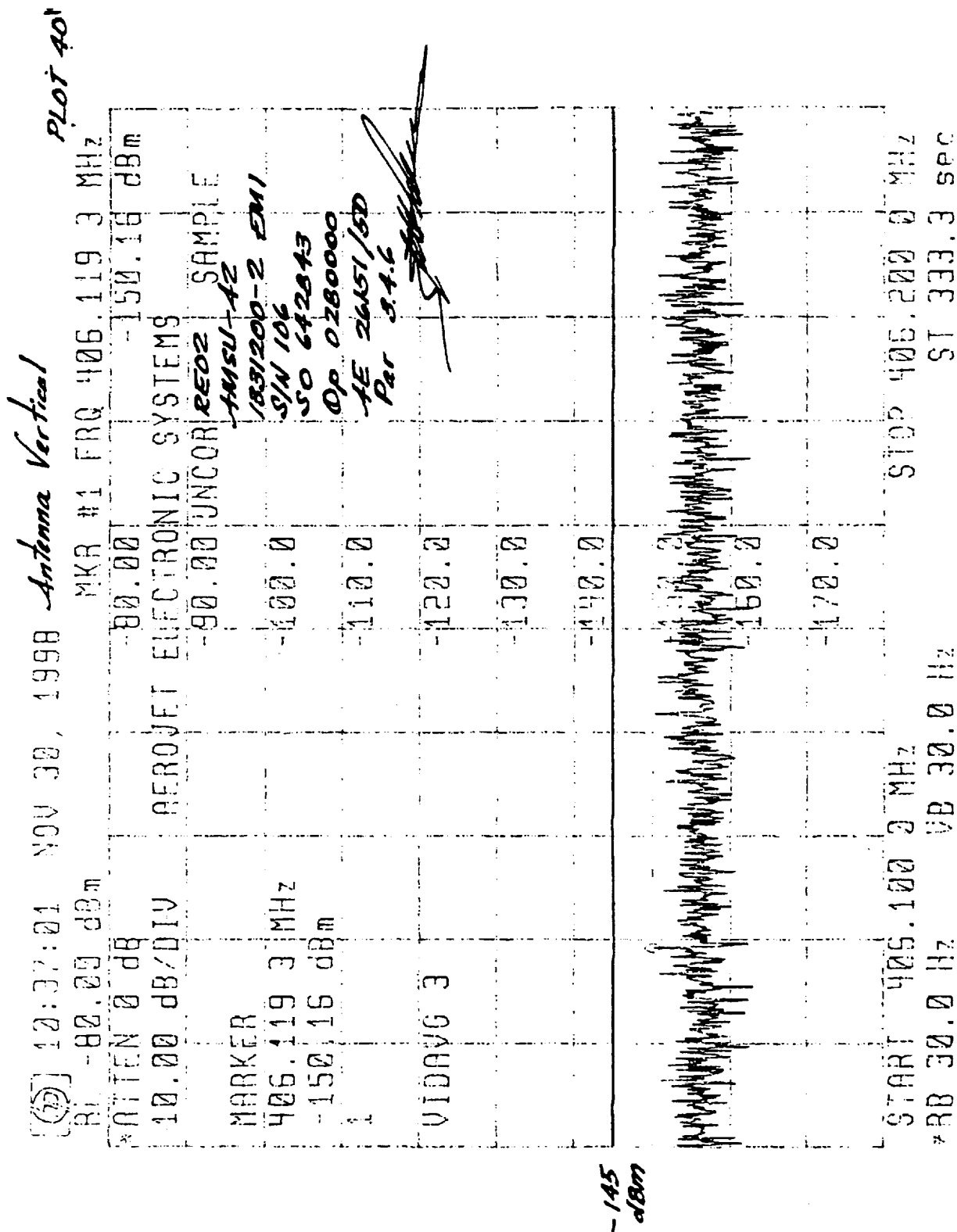


Figure 41. Plot 40

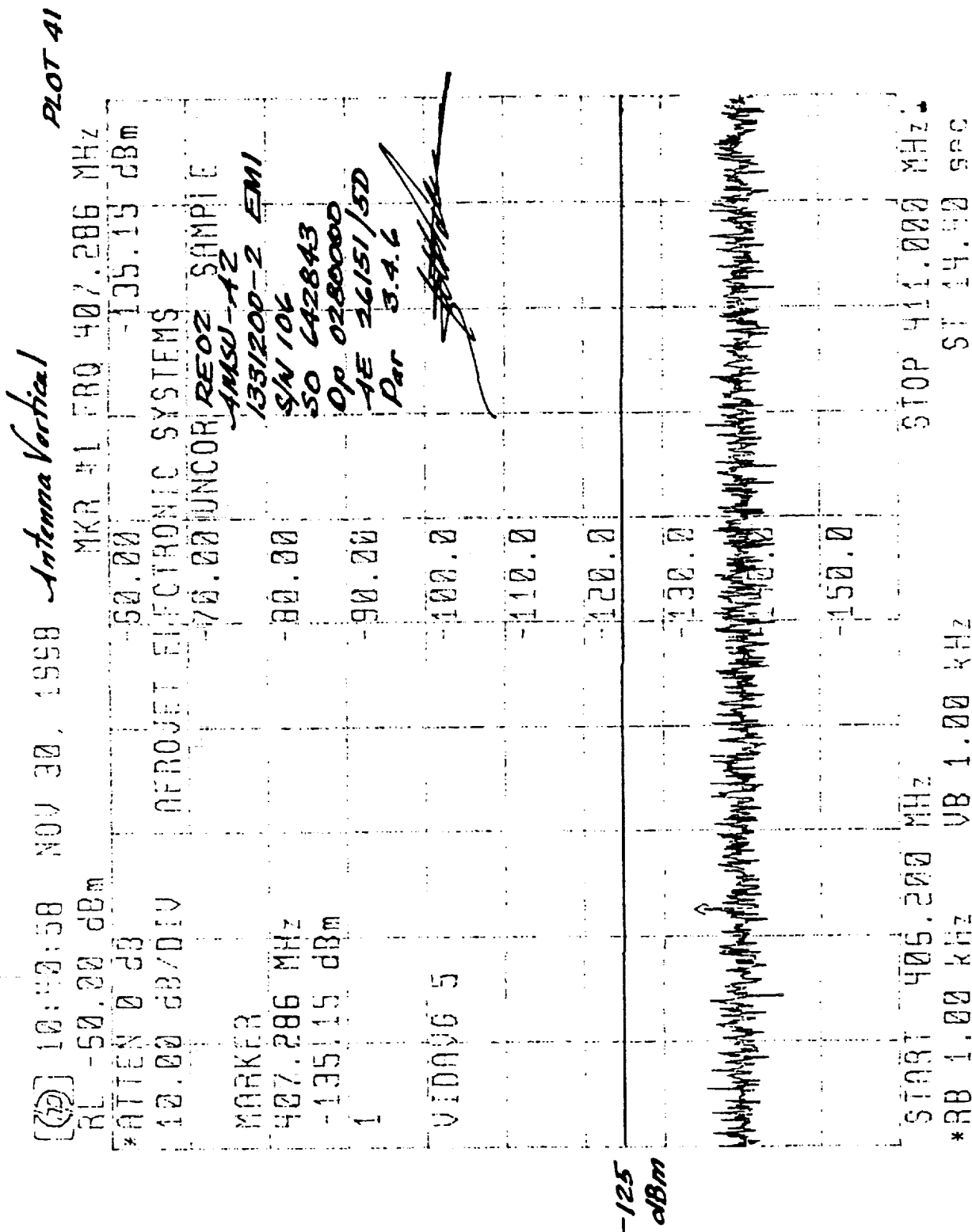


Figure 42. Plot 41

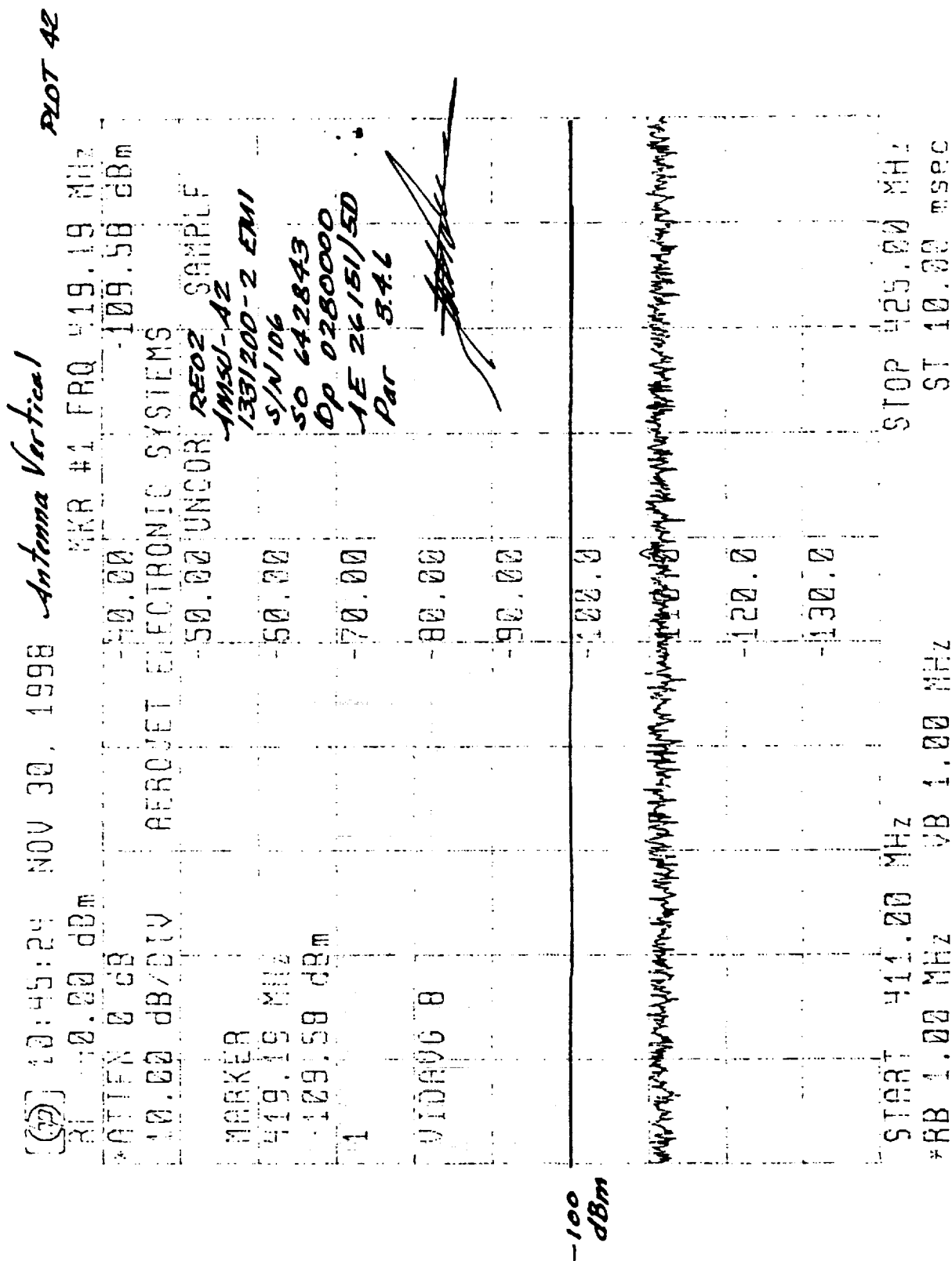


Figure 43. Plot 42

PLOT 43

Antenna Horizontal

DEC 1, 1998

08:41:33

RL -80.00 dBm MKR #1 FRQ 401.067 MHz

|              |                            |       |               |        |             |
|--------------|----------------------------|-------|---------------|--------|-------------|
| *ATTEN 0 dB  | -80.00                     |       |               |        | -131.49 dBm |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |       |               |        |             |
| MARKER       | -90.00                     | UNCOR | REO2          | SAMPLE |             |
| 401.067 MHz  | -100.0                     |       | AMSU-A2       |        |             |
| -131.49 dBm  | -110.0                     |       | 1331200-2 EMI |        |             |
| 1            | -120.0                     |       | S/N 106       |        |             |
| VIDAUG 8     | -130.0                     |       | 50 642843     |        |             |
|              | -140.0                     |       | Op 0280000    |        |             |
|              | -150.0                     |       | 4E 26157/50   |        |             |
|              | -160.0                     |       | Par 8.4.6     |        |             |
|              | -170.0                     |       |               |        |             |

START 396.000 MHz  
\*RB 3.00 kHz VB 3.00 kHz

STOP 401.500 MHz  
ST 1.833 sec

-125  
dBm

Figure 44. Plot 43







**HP** 15:33:52 NOV 25, 1998 *Antenna Horizontal* **PLOT 47**  
 RL -80.00 dBm MKR #1 FRQ 405.496 MHz

|              |                            |             |
|--------------|----------------------------|-------------|
| *ATTEN 0 dB  | -80.00                     | -128.98 dBm |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |             |
| MARKER       | -90.00 UNCOR RE02 SAMPLE   |             |
| 405.496 MHz  | <i>ANISU-AZ</i>            |             |
| -128.96 dBm  | <i>1331200-2 EMI</i>       |             |
| 1            | <i>SN 104</i>              |             |
|              | <i>50 422843</i>           |             |
|              | <i>OP 0280000</i>          |             |
|              | <i>AE 26151/50</i>         |             |
|              | <i>Par 3.4.6</i>           |             |
| VIDAUG 8     | -120.0                     |             |
|              | -130.0                     |             |
|              | -140.0                     |             |
|              | -150.0                     |             |
|              | -160.0                     |             |
|              | -170.0                     |             |

START 401.800 MHz STOP 406.000 MHz  
 \*RB 3.00 kHz VB 3.00 kHz ST 1.400 sec

-125  
dBm

Figure 48. Plot 47



PLOT 48

09:24:56 DEC 1, 1998 Antenna Vertical

RL -80.00 dBm MKR #1 FRQ 399.988 MHz

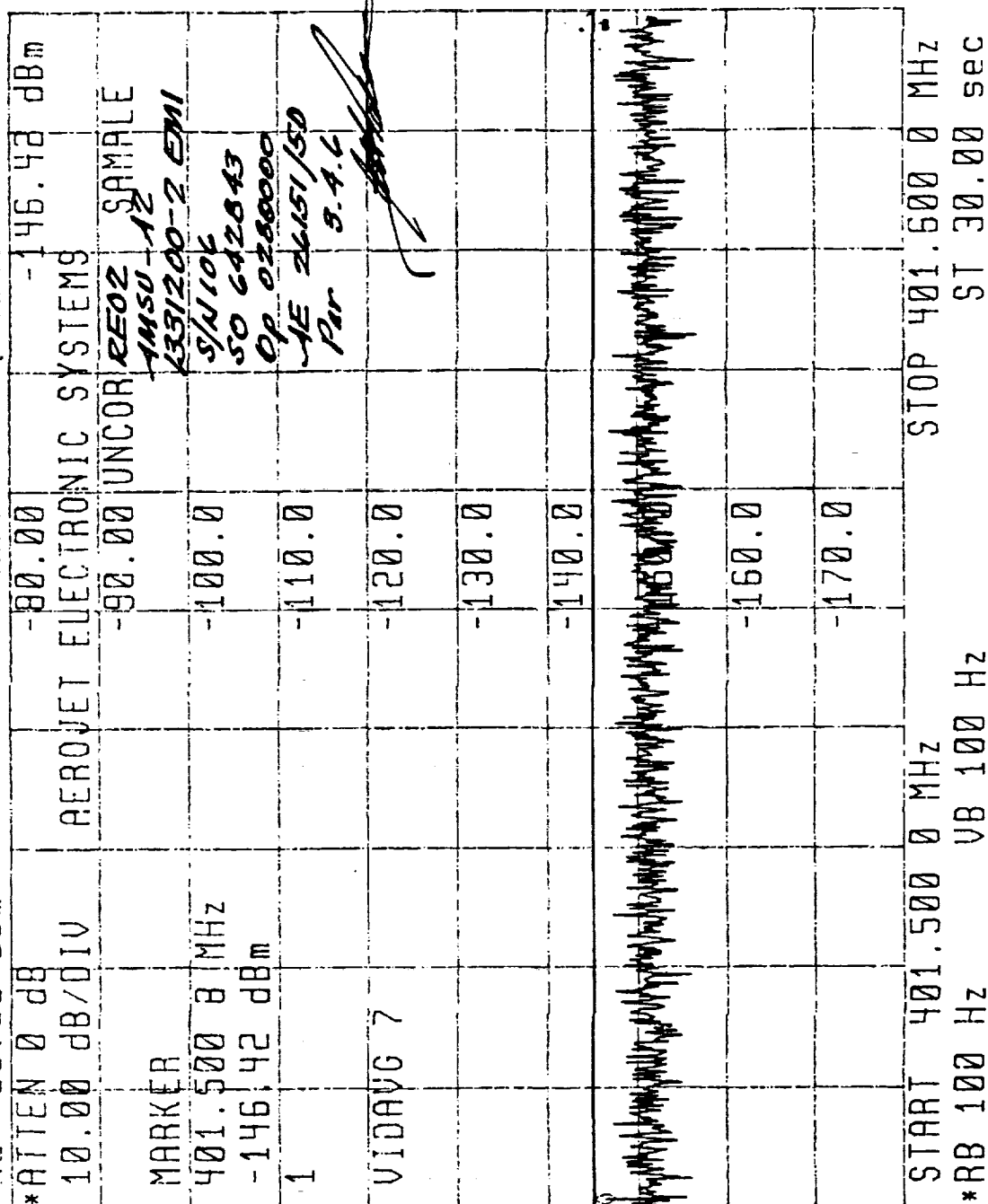
| *ATTEN 0 dB  | AEROJET ELECTRONIC SYSTEMS | -80.00 | -133.38 dBm   |
|--------------|----------------------------|--------|---------------|
| 10.00 dB/DIV |                            |        |               |
| MARKER       |                            | -90.00 | RE02 SAMPLE   |
| 399.988 MHz  |                            |        | AMISU-AZ      |
| -133.38 dBm  |                            |        | 1331200-2 EMI |
| 1            |                            | -100.0 | S/N 106       |
|              |                            |        | 50 642843     |
|              |                            |        | 00 0280000    |
|              |                            | -110.0 | AE 26151/50   |
|              |                            |        | Per 8.4.6     |
| VIDAUG 8     |                            | -120.0 |               |
|              |                            |        |               |
|              |                            | -130.0 |               |
|              |                            |        |               |
|              |                            | -140.0 |               |
|              |                            |        |               |
|              |                            | -150.0 |               |
|              |                            |        |               |
|              |                            | -160.0 |               |
|              |                            |        |               |
|              |                            | -170.0 |               |

START 396.000 MHz STOP 401.500 MHz  
\*RB 3.00 kHz VB 3.00 kHz ST 1.833 sec

-125  
dBm

Figure 49. Plot 48

11:05:31 NOV 30, 1998 Antenna Vertical PLOT 49  
RL -80.00 dBm MKR #1 FRQ 401.500 B MHz



145-145

Figure 50. Plot 49

12:46:53 NOV 30, 1998 Antenna Vertical PLOT 50  
RL -80.00 dBm MKR #1 FRQ 401.645 3 MHz

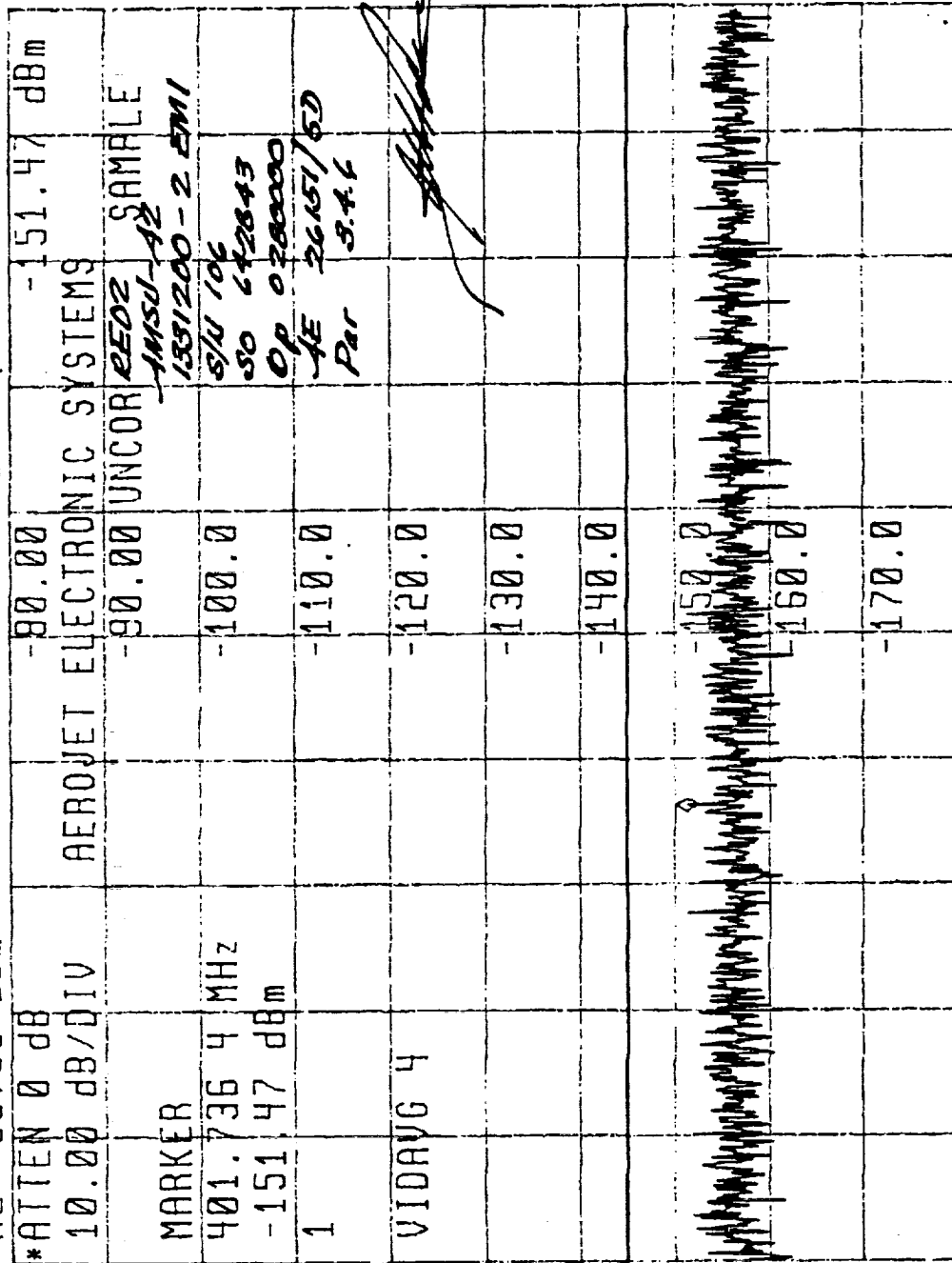
|               |        |                            |             |
|---------------|--------|----------------------------|-------------|
| *ATTEN 0 dB   | -80.00 | AEROJET ELECTRONIC SYSTEMS | -153.14 dBm |
| 10.00 dB/DIV  | -90.00 | UNCOR REO2 SAMPLE          |             |
| MARKER        |        | AMSU #2                    |             |
| 401.645 3 MHz | -100.0 | 1331200-2 EN1              |             |
| -153.14 dBm   |        | S/N 106                    |             |
| 1             | -110.0 | 50 642843                  |             |
| VIDAVG 8      | -120.0 | Op 0280000                 |             |
|               | -130.0 | AE 26151/50                |             |
|               | -140.0 | Par 3.4.0                  |             |
|               | -150.0 |                            |             |
|               | -160.0 |                            |             |
|               | -170.0 |                            |             |

CENTER 401.650 0 MHz SPAN 100.0 kHz  
\*RB 30.0 Hz VB 30.0 Hz ST 333.3 sec

-150  
dBm

Figure 51. Plot 50

13:10:21 NOV 30, 1998 Antenna Vertical PLOT 51  
RL -80.00 dBm MKR #1 FRQ 401.736 4 MHz



-145  
dBm

START 401.700 0 MHz STOP 401.800 0 MHz  
\*RB 30.0 Hz VB 30.0 Hz ST 333.3 sec

Figure 52. Plot 51





PLOT 54

Antenna Vertical

NOV 30, 1998

13:29:39

MKR #1 FRQ 2.037 86 GHz

RL -60.00 dBm

|              |                            |       |               |             |
|--------------|----------------------------|-------|---------------|-------------|
| *ATTEN 0 dB  | -60.00                     |       |               | -132.19 dBm |
| 10.00 dB/DIV | AEROJET ELECTRONIC SYSTEMS |       |               |             |
| MARKER       | -70.00                     | UNCOR | REC2 SAMPLE   |             |
| 2.037 86 GHz |                            |       | AMSU-A2       |             |
| -132.19 dBm  | -80.00                     |       | 1831200-2 ENI |             |
| 1            | -90.00                     |       | S/N 106       |             |
|              |                            |       | 50 642843     |             |
|              |                            |       | Op 0280000    |             |
|              |                            |       | AE 26157/50   |             |
| VIDAUG 8     | -100.0                     |       | Par 3.4.6     |             |
|              | -110.0                     |       |               |             |
|              | -120.0                     |       |               |             |
|              | -130.0                     |       |               |             |
|              | -140.0                     |       |               |             |
|              | -150.0                     |       |               |             |

STOP 2.040 00 GHz  
ST 10.00 sec

VB 3.00 kHz

START 2.010 00 GHz


\*RB 3.00 kHz

-120  
dBm

Figure 55. Plot 54





|  |  |  |                  |
|--|--|--|------------------|
| <br><b>NASA</b><br>National Aeronautics and<br>Space Administration   |  | Report Documentation Page                                    |                  |
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| 7. Author(s)<br><br>A. Valdez  |  | 8. Performing Organization Report No.<br>11382               |                  |
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|  |  | 13. Type of Report and Period Covered<br>Final               |                  |
|  |  | 14. Sponsoring Agency Code<br>---                            |                  |
| 15. Supplementary Notes<br><br>---   |  |  |                  |
| 16. ABSTRACT (Maximum 200 words )<br><br>This is the Engineering Test Report, SARR, SARP, DCS Receivers, Link Frequencies<br>EMI Sensitive Band Test Results, AMSU-A2, S/N 107, for the Integrated Advanced<br>Microwave Sounding Unit-A (AMSU-A). |  |  |                  |
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PREPARATION OF THE REPORT DOCUMENTATION PAGE

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